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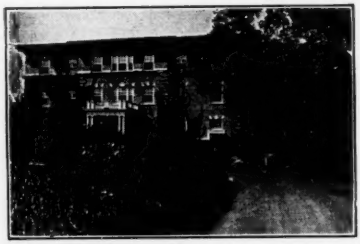

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The Journal of Nervous and Mental Disease

Vol. 121, No. 2 FEBRUARY 1955 Serial No. 878

FACTORS INFLUENCING THE RATE OF FIRST ADMISSION TO MENTAL HOSPITAL

J. M. WANKLIN, B.A., D. F. FLEMING, M.A., C. W. BUCK, M.D., PH.D., D.P.H., AND G. E. HOBBS, B.A., M.D., M.P.H.

INTRODUCTION

Over the years (2), observed differences in the rate of mental hospital admissions, both between and within countries, have formed the basis for considerable study and speculation. First admission rates have received particular attention and numerous investigators have assumed that differences among these reflect variations in the incidence of mental illness. Others, however, have contended that since many of the differences in rates occur between areas having divergent economic and political structures, they are at least partly explainable on the basis of differences in the availability of hospital services and in attitudes of people toward the hospitalization of the mentally ill.

Anyone who has studied mental illness on the mass level can understand why first admission rates often have been chosen as a measure of incidence. In the first place, the definition of a case becomes objective and straightforward. Alternative definitions (4) usually lead to difficulties in establishing the limits of normal behavior. Secondly, the use of hospital records is more practical than the method of community survey which is laborious and costly even in the most circumscribed population.

In view of these advantages of the first admission rate, it is surely unwise to discard the measure prematurely on the basis of objections which, however impressive, have never been established beyond the level of theory. Rather, an attempt should first be made to assess the validity of those objections.

The present study grew from the belief that if factors in addition to the occurence of an illness influence the likelihood of hospitalization, they should in some way be reflected in hospital statistics. We hoped to find, within patterns of first admission rates, evidence which would permit some evaluation of the extent to which these rates are, on one hand, a reflection of incidence, and on the other, a reflection of the need or desire to hospitalize the mentally ill.

SCOPE AND METHODOLOGY

Area of study

The geographical area chosen for this intensive study of first admission rates was that section of the Province of Ontario consisting of 14 Counties and commonly designated as Western Ontario.

Inhabited by approximately one-quarter of Ontario's four and one-half million residents, Western Ontario includes densely populated industrial areas and rich farm lands near its southern boundaries, and a sparsely settled, rather unproductive northern peninsula. Two of its cities have populations which exceed 100,000. One is a university center and the other is a highly industrialized and cosmopolitan city. So, although the area is not extensive, its diversified characteristics make it almost ideal for a study of this kind.

Period of study

First admission data were assembled for the years 1950 to 1952 inclusive. Each rate was then expressed as the average of the 3 yearly rates for the period, using the 1951 Census of Canada as the base population.

Source and type of information

Information was obtained from complete case records, on file at the hospitals of admission, and made accessible through the active cooperation of the medical staffs of these institutions. This approach allowed more detailed analyses than would be possible from the records of a central statistical office, where many studies of this type originate.

The information was coded on peripheral punch cards to facilitate analysis and was of two types—that which pertained to the patient's life history, and that related to the illness and circumstances leading to hospitalization.

The sample

Funds and personnel were not available to permit the collection of data from all of the hospitals admitting patients from Western Ontario. A compromise, which was somewhat reluctantly adopted, limited the collection of data to two large Provincial Institutions[1] located within 20 miles of the University. The resulting sample included 1,983 first admissions from Western Ontario, admitted to these two hospitals between January 1, 1950 and December 31, 1952.

Excluded were: 1) juvenile mental defectives, epileptic and tuberculous mental patients and the criminally insane who are sent to specialized Provincial institutions, and 2) patients admitted to a Federal Veterans' hospital and to a small private sanitorium. Because of this, most juvenile patients were eliminated from the sample, and a disproportionate number of adult males was excluded.

However, on the basis of a tabulation of all Western Ontario first admissions for 1950, published in the provincial hospitals' annual report (1), it was established that the sample studied for that year was representative of the total admissions in terms of its distribution by county of residence. Since no regional bias was introduced, it is rather unlikely that the sample was distorted with respect to other social variables under consideration. Nevertheless, the observations and conclusions arising from this study pertain, with certainty, only to those forms of mental illness occurring in the civilian population over 15 years of age, and uncomplicated by tuberculosis, epilepsy or serious criminality.

Grouping diagnoses for analysis

Investigators (3) have adequately demonstrated that when specific diagnostic entities are dealt with singly, the rates are often colored by the diagnostic policies of the hospitals involved. We therefore grouped the diagnoses on the basis of a seven-fold classification comparable to that employed by Sumner and Harman (7). The more important disorders included under each of the headings are outlined below:

1. Functional psychoses
   (a) Schizophrenia
   (b) Manic depressive psychosis
   (c) Involutional melancholia
2. Psychoneuroses
3. Psychoses with organic disease
   (a) Psychosis with mental deficiency
   (b) Psychosis with epilepsy
4. Without psychosis
   (a) Mental deficiency
   (b) Epilepsy
   (c) Other (e.g.: simple adult maladjustment)
5. Psychoses due to alcohol and drugs
6. Psychoses due to syphilis—general paresis of the insane
7. Psychoses associated with old age
   (a) Senile psychosis
   (b) Psychosis with cerebral arteriosclerosis

Results

General admission rates from Western Ontario

Age-sex specific rates (table 1). Wherever possible, the analyses carried out in this study were age and sex specific, and at all times, rates were expressed per 100,000 population, per year. The over-all distribution of the ad-

TABLE 1.—Rates per 100,000, by Age and Sex

Age	Male	Female	Male Plus Female
15–24	50.8	47.3	49.1
25–34	62.0	73.1	67.6
35–44	67.6	69.5	68.5
45–54	65.3	82.0	73.4
55–64	72.8	72.0	72.4
65+	172.2	162.6	167.4
Total*	76.3	81.2	78.7

[1] The Ontario Hospitals at London and St. Thomas.

* Based on population 15 years and over.

mission sample on the basis of the two variables as described below.

Rates for both sexes tended to increase with age—notably from a rate of 49.1 at ages 15 to 24 to a rate of 67.6 at ages 25 to 34, and in particular from 72.4 at ages 55 to 64, to 167.4 at ages 65 and over. These points of increase and the intervening plateau correspond to the age curve demonstrated by other studies. The failure of male rates generally to exceed the female, as they are usually reported to do, probably is a reflection of the previously described sex bias of our sample. Throughout the analyses, therefore, sex-differences in the rates were felt to be of questionable significance.

Rates by diagnostic groups, by age and sex (table 2). The diagnostic composition of the rates at various ages, and for each sex separately, was revealed in the following analysis.

(a) Functional psychoses: Rates for this group were highest at ages 25 to 54 (40.6 to 41.1), where they comprised about 60 per cent of the total admissions. When, in spite of our stated reluctance to do so, schizophrenia and manic depressive psychosis were considered separately, it was found that rates for the former reached a peak at ages 25 to 34, while for the latter, the peak was reached at ages 45 to 64.

(b) Psychoses with organic disease: Rates for the sexes combined increased with age from 2.7 at ages 25 to 34, to 4.6 at ages 55 to 64. Because the male rate was highest at ages 65 and over (5.7) and the female at ages 45 to 54 (6.3), sex differences in the

TABLE 2.—RATES PER 100,000 BY DIAGNOSTIC GROUPS, BY AGES AND SEX

Age	*M*	*F*	*M+F*	*M*	*F*	*M+F*	*M*	*F*	*M+F*
	Functional			*Schizophrenia†*			*Manic depressive†*		
15–24	24.4	23.4	23.9	20.4	16.6	18.6	2.7	4.5	3.6
25–34	30.6	50.4	40.6	25.6	37.3	31.6	3.4	9.3	6.4
35–44	29.7	47.7	38.5	16.2	29.8	22.8	8.9	10.3	9.6
45–54	33.1	49.4	41.1	11.9	17.4	14.5	13.8	15.3	14.5
55–64	31.5	39.0	35.2	28.9	11.9	20.4	13.8	15.3	14.5
65+	16.6	26.1	21.6	1.3	6.3	3.9	9.6	13.7	11.7
Total*	28.0	39.7	33.8	15.1	21.5	18.3	8.0	10.7	9.4
	With organic disease			*Psychoneuroses*			*Associated with old age*		
15–24	0.8	5.7	3.2	2.7	5.2	4.0	0.0	0.0	0.0
25–34	2.3	3.0	2.7	7.2	8.2	7.8	0.0	0.0	0.0
35–44	2.9	4.9	3.9	8.9	9.8	9.3	0.0	0.0	0.0
45–54	2.5	6.3	4.4	5.9	11.5	8.6	1.0	2.1	1.5
55–64	3.3	5.9	4.6	6.5	7.3	6.9	14.4	10.5	12.5
65+	5.7	2.9	4.2	1.3	4.6	3.0	139.1	125.1	131.7
Total*	2.7	4.7	3.7	5.6	7.8	6.7	19.2	19.1	19.1
	Due to alcohol & drugs			*Due to syphillis*			*Without psychosis*		
15–24	0.0	0.0	0.0	0.4	0.8	0.6	22.1	11.6	16.9
25–34	1.1	0.8	1.0	0.3	0.3	0.4	19.2	9.0	14.0
35–44	3.4	0.9	2.2	0.4	0.4	0.4	18.7	6.3	12.6
45–54	2.5	3.6	3.1	4.5	0.5	2.5	13.8	6.3	10.2
55–64	2.6	2.6	2.6	5.3	2.0	3.7	8.5	2.3	5.6
65+	2.5	1.2	1.8	1.3	0.5	0.9	3.3	0.5	1.8
Total*	1.9	1.4	1.6	1.7	0.7	1.2	15.5	6.7	11.1

* Based on population 15 years and over.

† Together, compose 84 per cent of functional group.

diagnostic composition of this group were suggested.

(c) Psychoneuroses: Ages 25 to 64 predominated in this diagnostic group, with the highest rate of 9.3 occurring at ages 35 to 44.

(d) Psychoses associated with old age: Appearing first at ages 45 to 54, the rate for these psychoses was relatively low until ages 65 and over (131.7).

(e) Psychoses due to alcohol and drugs: The rate for the sexes combined reached a peak of 3.1 at ages 45 to 54, although the male rate was highest at ages 35 to 44 (3.4). Whether males develop these psychoses earlier in life than the females, or whether they are hospitalized sooner, is not easily determined.

(f) Psychoses due to syphilis: Limited almost entirely to ages 45 to 64, the total crude rate (1.2) was lower than that for any other diagnostic group, and arose largely from male admissions.

(g) Without psychosis: The rate for the sexes combined was highest at ages 15 to 24 (16.9) and then decreased with age. At all ages, male rates were notably higher than the female, in spite of the known sex bias of the sample.

Three of the diagnostic groups figured most prominently in the composition of the admissions: 1) functional, 2) without psychosis and 3) psychoses associated with old age. Each, in turn, was in greatest evidence within different segments of the age span.

At ages 25 to 64—the plateau of the age curve—the functional group of psychoses predominated; at ages 15 to 24 where the admission rate was comparatively low, the without psychosis group competed with the functional; at ages 65 and over approximately 80 per cent of the admissions were of the group psychoses associated with old age.

The distinctions between the rates of these broad age groups in terms of their diagnostic make-up figured prominently in the conclusions reached on the basis of the following analyses.

Comparison of rural and urban admissions

Rural-urban differences in admission rates were given particular attention. Various associated indices added a measure of substance to the interpretation of the differences observed.

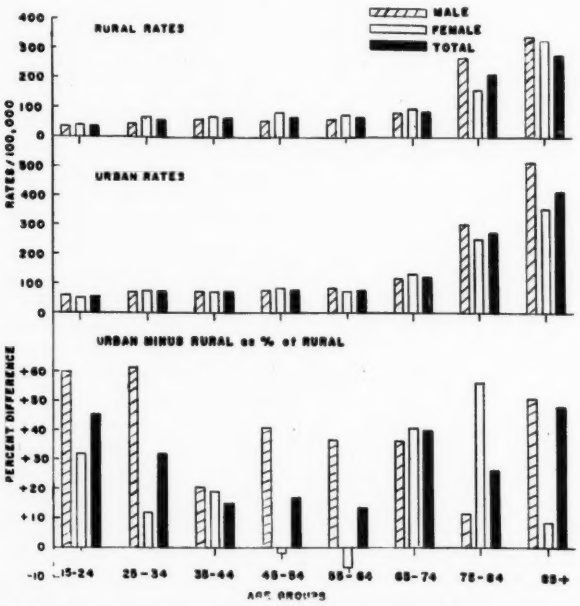

FIG. 1. Comparison: rural and urban rates by age and sex.

Crude rates by population size—all diagnoses. The combined rate for the five cities in Western Ontario having populations of 30,000 and over (75.1) was significantly higher than that for rural areas (under 1,000 population) (47.5), and significantly higher, also, than the rate for the smaller urban centres (52.6). The excess of the latter rate over that for rural areas was small and not statistically significant.

Lack of appropriate census data made the age standardization of these rates impossible, but it is unlikely that such a procedure would have greatly modified the relationships. It was therefore concluded that population density influenced the level of admission rates, not only on a rural-urban basis, but among urban areas of varying size.

Age-sex specific rates for rural and urban populations—all diagnoses (fig. 1). Available census data did not permit the derivation of urban age-sex specific rates by population size. Instead, rates for all urban areas combined (1,000 population and over) were compared with those for the rural areas. On the basis of observations made in the preceding section, it can probably be assumed that if age-sex specific rates for rural areas could have been compared with those for areas of 30,000 and over, the resulting differences would have been exaggerations of those which are to be described.

While it is true that the urban rate was higher than the rural, the excess was not constant from age to age, nor between the sexes. Urban proportionate excesses were greatest among males at ages 15 to 34 (where the difference between rural and urban rates ranged from 59.7 to 61.3 per cent of the rural rate). Small urban excesses found for males at other ages, were not statistically significant. Rural and urban female rates were more comparable than the male at most ages, and in only one age group (75 to 84) was an urban excess (56.2 per cent) statistically significant. Although they usually lacked statistical significance, urban excesses in the rates for both sexes after age 65 were quite marked. It was shown, then, that rural-urban differences in rates were greatest among young adults and

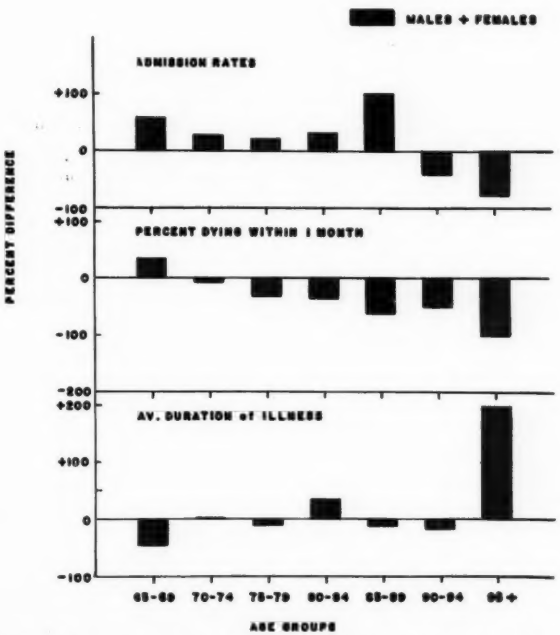

FIG. 2. Comparison: rural and urban, ages 65+ (urban minus rural as % of rural).

TABLE 3.—Rural and Urban Admissions, Ages 65 and Over by 5 Years Age Groups

	Admission Rates per 100,000			*Per cent Dying within 1 Month of Admission*			*Average Duration of Illness Before Hospitalization (Years*		
	Rural	*Urban*	*Diff. as % of Rural*	*Rural*	*Urban*	*Diff. as % of Rural*	*Rural*	*Urban*	*Diff. as % of Rural*
65–69	65.9	104.3	58.3*	6.7	9.0	34.3	7.3	3.9	−46.6
70–74	116.8	148.9	27.5	18.6	17.2	−7.5	2.9	3.0	3.4
75–79	203.7	248.5	22.0	24.0	16.1	−32.9	3.0	2.7	−10.0
80–84	238.2	315.6	32.5	20.6	13.4	−35.0	2.8	3.8	35.7
85–89	232.2	467.3	101.2*	57.1	22.0	−61.5†	3.8	3.4	−10.5
90–94	458.2	269.3	−41.2	28.6	14.3	−50.0	6.0	5.0	−16.7
95+	804.6	194.8	−75.8	50.0	0.0	−100.0	0.5	1.5	10.0

* Significant at 0.05 level.
† Significant at 0.01 level.

the aged, and generally were more extreme among males than among females.

Rural and urban comparisons in the upper age group (ages 65 and over); more detailed analysis by 5-year age groups (table 3 and fig. 2). The first admission rate for ages 65 and over, at a high level and increasing rapidly over the years, is thought by many to reflect a growing lack of available home care. If this factor influences the hospitalization of the aged, it will likely exert its greatest effect in urban areas characterized by crowded living conditions and by a relatively high proportion of women with jobs outside the home. Urban excesses within the old-age group of admissions were therefore assessed as to the extent to which they suggested, on one hand, real differences in incidence, and on the other, the effect of varying degrees of pressure for hospitalization.

(a) Age specific rates: Urban rates did not exceed the rural at all ages over 65. Because urban rates reached a peak at ages 85 to 89 (467.3) and then declined, while rural rates continued to increase until age 95 and over (804.6), rural excesses occurred at ages 90 and over. These excesses lacked statistical significance, but in view of the regularity of the age curves from which they were derived, seemed worthy of some consideration.

Here was evidence, then, that after age 65, an urban resident, if he were to enter hospital, was most likely to do so before age 89, while the probability of a rural inhabitant entering increased past this age. This observation pointed to: 1) a tendency for urban patients to be hospitalized during an earlier phase of their illness, or 2) an earlier average age of onset of the degenerative psychoses among urban patients. Each of these possibilities is considered below.

(b) Proportion of patients dying within one month of admission: This was selected as a rough index of the proportion of patients who were admitted during the terminal phase of their illness.

At all ages except 65 to 69 the proportion dying was higher among rural admissions than among urban, and the difference increased with age due to progressive increases in the rural proportion. This observation, coupled with those concerning the different age trends of rural and urban rates, leads to a speculative kind of conclusion. It may be postulated that the urban rate was higher than the rural up to ages 85 to 89 because of a greater urban tendency to admit early cases; after these ages a backlog of rural patients who had been cared for at home until advanced symptoms made this no longer possible, augmented the rural rate and caused it to exceed the urban.

(c) Average duration of illness before hospitalization: It has already been demonstrated that the degenerative psychoses predominated at ages 65 and over. On the basis of our present understanding of the etiology of these illnesses, rural-urban differences in their average age of onset seem about as unlikely as do differences in their true incidence.

Unfortunately, a comparison of the average duration of illness for rural and urban admissions did little to either confirm or negate this opinion. Rural-urban differences showed no consistent trend from age to age and, because of the smallness of the sample and the large variances around mean values, were without statistical significance. But probably the most important defect of this analysis was the fact that since information concerning the onset of symptoms had usually been obtained from the family, attitudes which may determine in part, the likelihood of hospitalization could have also detracted from the objectiveness of this information.

Rates by the diagnostic groups, functional and without psychosis for rural and urban populations (table 4). Rural-urban differences among the rates at ages 15 to 64 were examined on the basis of the two diagnostic groups which predominated at these ages.

(a) Functional group: Except for males aged 15 to 24, urban excesses within the diagnostic group were neither large, consistent nor statistically significant. There was, in fact, evidence of an over-all rural excess among females.

(b) Without psychosis: As with the functional group, an urban excess was largely the result of male differences. These were greatest at ages 25 to 34, and 45 to 54. A moderate female urban excess was reversed at ages 45 and over.

The higher urban rates for the functional group of psychoses among males at the younger ages, could sensibly be related to rural-urban differences in incidence. The stressful aspects of a modern society, which are sometimes thought to influence the occurrence of mental disease, are particularly evident in urban areas; and urban males, because of their economic role, are probably most vulnerable to these stresses.

This interpretation is applied with much more difficulty to the similar, but exaggerated, rural-urban differences found within the diagnostic group without psychosis. At ages 15 to 24, this group included a sizeable proportion

TABLE 4.—RURAL AND URBAN RATES PER 100,000 BY DIAGNOSTIC GROUPS BY AGE AND SEX

Age	*Rural*			*Urban*			*Difference as Per Cent of Rural*		
	M	*F*	*M+F*	*M*	*F*	*M+F*	*M*	*F*	*M+F*
				Functional†					
15–24	16.5	24.4	19.8	30.0	23.1	26.4	81.8‡	−5.3	33.3
25–34	31.4	50.9	40.9	30.2	50.3	40.5	−3.8	−1.4	−1.0
35–44	22.7	49.0	34.8	32.7	47.6	40.2	44.1	−2.9	15.5
45–54	33.7	56.8	44.3	32.7	45.2	39.1	−3.0	−20.4	−11.7
55–64	28.3	39.5	33.5	33.5	38.8	36.3	18.4	7.1	8.4
65+	13.6	20.6	17.0	18.9	29.2	24.6	39.0	41.7	44.7
Total*	24.2	40.6	31.9	30.1	39.3	34.9	24.4	−3.2	9.4
				Without Psychosis†					
15–24	18.2	8.4	14.0	24.6	13.3	18.8	35.2	58.3	34.3
25–34	6.5	7.8	7.1	26.1	9.5	17.5	301.0§	21.8	146.5§
35–44	15.9	5.0	10.8	20.5	6.7	13.6	29.0	34.0	25.9
45–54	6.4	7.4	6.7	18.9	5.7	12.3	195.0‡	−23.0	83.6
55–64	8.4	5.6	7.1	8.8	0.9	4.7	4.8	−84.0	−33.8
65+	3.2	1.4	2.3	3.3	0.0	1.5	3.1	−100.0	−34.8
Total*	10.4	6.2	8.4	18.8	6.9	12.7	80.8§	11.3	51.2§

* Based on population 15 years and over.
† Together, comprise 57 per cent of all admissions.
‡ Significant at 0.05 level.
§ Significant at 0.01 level.

TABLE 5.—RATES PER 100,000 BY MARITAL STATUS BY AGE

Age	Married Rate	Single, Divorced and Separated Rates	Diff. as % of Married	Widowed Rate	Diff. as % Married
15–24	21.8	57.7	164.7†	0.0	0.0
25–34	43.6	173.3	297.4†	0.0	0.0
35–44	43.5	202.3	365.0†	0.0	0.0
45–54	50.7	240.9	304.1†	74.5	6.9
55–64	52.1	172.7	231.4†	109.4	110.0†
65+	108.7	342.2	214.8†	189.8	74.6†
Total*	50.9	126.7	148.9†	160.4	215.1†

* Based on population 15 years and over.
† Significant at 0.01 level.

of mental defectives; at ages 25 to 64 most of the diagnoses were vague but suggested minor personality abnormalities. For many of these admissions, then, hospitalization hardly seemed to be an appropriate procedure. Some, in fact, were not certified and received no treatment; they had been admitted by court remand following an arrest, and after a period of observation in hospital were returned to court for sentence.

Of the total rural male admissions ages 15 to 64, 20.8 per cent came directly from jail while among the total urban male admissions of the same ages, 29.2 per cent were from this source. In other words, the urban excess in male admission rates at the younger ages was caused, in part, by an excess in the number who entered hospital without clinically recognized psychotic symptoms, but as the result of behavior which could not be tolerated by their society. Urban living, more than rural, may be conducive to the development of these personality types and it may also tend to attract them. But it may be, too, that urban living conditions make their detection and disposition more certain.

The latter interpretation could also be given to rural-urban differences among admissions comprising the functional group since behavior symptoms, often of an asocial variety, are their recognizable feature.

So then, while urban excesses in rates for both sexes at the upper age were more suggestive of a greater urban tendency to dispose of the aged and infirm, the nature of urban excesses among the males at the younger ages could represent rural-urban differences both in incidence and in the likelihood of hospitalization.

Comparison of admissions by marital status

An analysis of first admission rates according to marital status led to general observations which are comparable to those of other studies. This analysis has as yet not proceeded as far as that of the rural-urban differences and, as a result, tentative conclusions must be even more speculative.

Age specific rates—Both Sexes (table 5). Rates for the married were, at all ages, lower than those for any other marital group. Proportionate excesses of the rate for single, divorced and separated combined, were statistically significant at all ages, and reached a maximum at ages 35 to 44 (365.0 per cent). Rates for the widowed, which were calculated only for ages 45 and over, were not as greatly in excess of those for the married as were the rates for the single, divorced and separated. However, at ages 55 to 64 where the proportionate difference between widowed and married was greatest (110.0 per cent), and at ages 65 and over (74.6 per cent), statistical significance was obtained.

Age specific rates by sex (fig. 3). To obtain a sample large enough to permit an analysis by sex, single, divorced and separated admissions were combined with the widowed and designated as "Other." It should be remembered, however, that before age 50 the single will have predominated, while after this age the widowed will have been almost entirely responsible for the admission rate of the group.

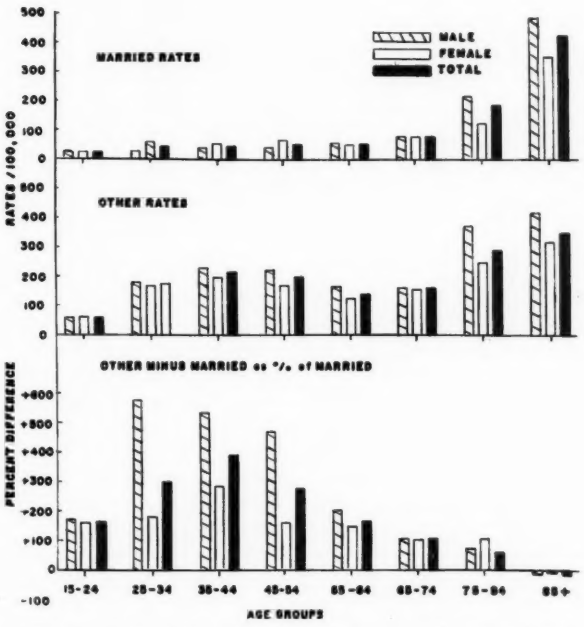

FIG. 3. Comparison: married and other rates by age and sex.

Proportionate excesses of rates for the other group over those for the married were comparable for both sexes at ages 65 and over. However, at ages 25 to 64 the excess was greater among males. Thus, widowhood seemed to have a comparable effect upon the admission rates for both sexes, while the failure to marry had more influence upon the rates for the males.

Here again, differences among rates had been found which could reflect differences both in incidence and in the tendency to hospitalize the mentally ill. Incidence may vary among marital groups because of at least two conditions. First, selection could be involved because the chance of marriage among the unstable, as a group, is almost certainly reduced, and when marriage does occur it will probably have a better than average chance of ending in divorce or separation. Moreover, Ødegärd (5) has pointed out that selection may operate, to a lesser extent, in the widowed group through remarriage. Second, an element of psychological protection may be gained through marriage, with the family circle acting as a buffer for some of society's strains and frustrations.

However, protection may also operate in terms of the likelihood of hospitalization. When mental illness occurs, the resources for home care may be most readily at hand among the married.

The tendency for male differences to be greater than female between the married and other groups at ages 15 to 64 is compatible with all of the possible explanations described above. Inadequate mental and personality resources, which handicap social adjustment, probably impede the marriage of males more than of females because of the former's traditional role as the provider in the family; Dayton (3) has suggested that the security of married life in some way benefits the male more than the female; and finally, the single male may be more likely than the female to move from the parental home, leaving behind the resources for home care and protection during a mental illness.

Age specific rates by duration of marriage (table 6). The analysis of differences in ad-

TABLE 6.—RATES PER 100,000 BY DURATION OF MARRIAGE.

	Duration 1–10 Years			Duration Over 10 Years			Difference as Per cent of Over 10		
Age	M	F	M+F	M	F	M+F	M	F	M+F
25–34	29.9	67.1	47.9	11.5	41.4	31.5	160.0*	62.1*	52.1*
35–44	94.2	313.5	146.1	28.7	37.2	33.2	228.2*	742.7*	340.1*

* Significant at 0.01 level.

mission rates among marital groups at the younger ages was carried one step further. Using rather tentative estimates for a base population, rates by duration of marriage were calculated for the married group at ages 25 to 44. Within each age group the rates for each sex were lower for those with the longer duration of marriage. In particular, the results pointed to a remarkably low rate for males who had married at a comparatively early age and whose marriage had been kept intact for more than 10 years. On the other hand, the rate for females who had married rather late in life, although below that for the single, divorced and separated at comparable ages, was noticeably high.

The general trend of rates by duration of marriage supported the belief that marriage offers some degree of psychological protection. However, the differential effect of duration of marriage upon the two sexes seemed to point to an element of selection through marriage. Males who marry early in life and who are able, financially and in other ways, to maintain a successful marriage, probably constitute a particularly stable group. On the other hand, females who fail to marry at the younger ages, in spite of an avowed desire on the part of most members of their sex to do so, may in many instances be hampered by personality inadequacies.

Selection through marriage as a factor contributing toward differences between the rates for married and single may be demonstrated further when an analysis by diagnosis has been completed. Preliminary results reveal that virtually all of the mental defective admissions were unmarried. For most of these patients marriage must have been impossible because of the mental retardation which eventually brought them to hospital.

The upper age group (ages 65 and over); a more detailed analysis by 5-year age groups for married and other populations (table 7 and fig. 4). (a) Age specific rates: Here, comparisons between married and other rates were

TABLE 7.—MARITAL GROUPS (MARRIED AND OTHER)

	Admission Rates per 100,000			Per cent Dying within One Month of Admission		
Age	Married	Other	Diff. as % of married	Married	Other	Diff. as % of married
65–69	59.7	146.8	145.9†	8.5	8.2	−3.5
70–74	108.5	170.6	57.2*	21.4	14.9	−30.4
75–79	156.5	285.1	82.2†	31.7	11.8	−62.8†
80–84	254.7	297.8	16.9	17.9	15.1	−15.6
85–89	391.9	366.4	−6.5	36.4	31.8	−12.6
90–94	234.4	350.2	49.0	100.0	15.4	−84.6†
95+	3043.5	0.0	−100.0	50.0	0.0	−100.0
Total	108.7	227.1	108.9†	21.5	12.3	−42.8†

* Significant at 0.05 level.
† Significant at 0.01 level.

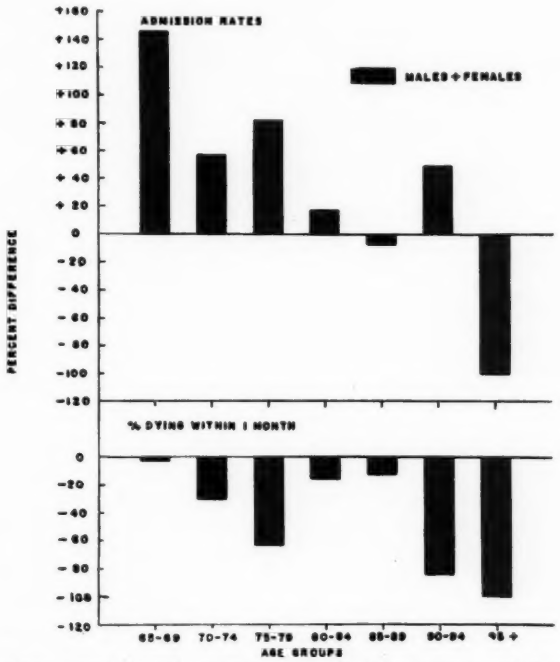

FIG. 4. Comparison: married and other, ages 65+ (other minus married as % of married).

made, keeping in mind the rural-urban relationships observed at these ages. The rural-urban differences were thought to be suggestive of a tendency to care for the rural mentally ill at home as long as possible, and it has already been postulated that the desire and capacity for home care may operate favourably among the married group as well.

Striking similarities between the two comparisons did, in fact, emerge. Like urban rates, those for the other group reached a peak at ages 85 to 89 (336.4) and then declined, while married rates resembled the rural in their tendency to increase with age until ages 90 and over (3043.5). As a result of these trends, moreover, statistically significant excesses in rates for the other group at ages 65 to 79 were reduced, or replaced by married excesses, at ages 80 and over. The latter, however, were not statistically significant.

(b) Proportion of patients dying within one month of admission: This proportion was higher among the married group, especially at ages 90 and over, and could again have reflected the tendency to keep the mentally disabled members of that group at home as long as possible.

The analyses which are now to be described were less extensive than the preceding ones and the results are merely presented in summary form. Their primary significance lies in the fact that the patterns of rates closely resemble those pertaining to rural and urban environment and marital status.

Comparison of admission rates by duration of schooling (table 8)

Age-sex specific rates for those out of school at the time of admission. Those with 8 years of schooling or less were more likely to have been admitted to a Provincial hospital than were those with a more extensive education. This applied at all ages, but especially at ages 15 to 24. At these ages schooling may have been terminated, in many instances, because of the onset of psychotic symptoms. More important, mental defectives without psychosis, who comprised 17 per cent of the admissions

TABLE 8.—Rates per 100,000 by Duration of Schooling by Age and Sex: Those Not Attending School on Admission

Age	*Schooling—8 Years and Under*			*Schooling—Over 8 Years*			*Difference as Per cent of Over 8 Years*		
	M	*F*	*M+F*	*M*	*F*	*M+F*	*M*	*F*	*M+F*
15–24	99.7	119.9	110.0	28.7	24.6	25.7	247.4‡	387.4‡	328.0‡
25–34	92.8	90.9	91.8	38.4	61.0	50.2	141.7‡	49.0†	82.9‡
35–44	88.3	87.7	88.0	44.4	52.7	48.8	98.9‡	66.4‡	80.3‡
45–54	79.1	91.0	84.4	30.2	68.5	51.2	161.9‡	32.8	64.8‡
55–64	84.6	85.0	84.8	31.3	48.2	40.7	170.3‡	76.3‡	108.4‡
65+	182.2	176.2	180.3	126.3	127.0	126.7	44.3†	38.7†	42.3‡
Total*	105.5	110.9	108.0	41.6	56.9	50.0	153.6‡	94.9‡	116.0‡

* Based on population 15 years and over.
† Significant at 0.05 level.
‡ Significant at 0.01 level.

aged 15 to 24, could not have proceeded far in school.

The rates at ages 25 to 54 showed that lack of education was a greater handicap to males than to females from the point of view of admission to mental hospital. The duration of schooling among males, being influenced by occupational goals, could be an expression of personality stability as well as of intellectual capacity. If this is so, selection of the more stable into the better educated group could have occurred.

The extent of education determines economic status to some extent. Among males, those with less education will more likely be at the lower end of the economic scale where they will experience, in material terms at least, more of society's viscissitudes than those whose financial resources are more adequate. A possible etiological effect upon incidence is thus suggested. However, marginal living conditions will probably make it less feasible to care for the mentally ill wage-earner outside of a mental institution, and so the familiar factor of home care is again invoked as a possible explanation for differences among the rates.

Obviously, it was impossible to distinguish between the relative influence of schooling upon incidence and upon the need or desire for hospitalization at this stage in the investigation.

Comparison of age-sex specific rates of native and foreign-born admissions (table 9)

Comparison of the rates for native and foreign-born was hampered because of a fault in the assembly of the data. Patients born in the United States were included with the native-born admissions, without taking note of the fact that they were defined as foreign-born in the census population used as a base for the calculation of rates. This error could no longer be corrected at the time of its discovery. Even though the native-born rates were artificially high, and the foreign-born rates too low because of the misplacement of American-born admissions, foreign-born excesses prevailed at certain ages. It can safely be assumed that these excesses would have been increased in size and number had the error not been made. Moreover, re-allocation of American-born admissions likely would not have altered greatly the relationship between rates by age or sex, or by time in Canada.

Foreign-born excesses occurred most often among the rates for those in Canada 5 years or less, most regularly among males and to a marked extent among males aged 15 to 44. Oedgaard (6) and others have made similar observations and their explanations are usually related to selection, environmental stress and lack of available home care and protection.

Knowledge of Canadian immigration policy, especially since World War II, did not encourage the speculation that immigrants represent a basically inferior sample of foreign populations, and the "selection theory" was thought to have dubious merit. The possible effect of the environment upon incidence should, however, be given consideration. Many of these

TABLE 9.—RATES PER 100,000 NATIVE AND FOREGN BORN

Age	*Admission Rates*			*Difference as Per cent of Native Born*		
	M	*F*	*M+F*	*M*	*F*	*M+F*
Native born						
15–24	49.3	46.9	48.1			
25–34	61.4	76.3	68.9			
35–44	66.3	68.3	67.3			
45–54	62.8	91.1	76.8			
55–64	72.5	78.8	75.8			
65+	185.0	173.3	178.7			
Total*	75.4	83.7	79.6			
Foreign born—in Canada more than 10 years						
15–24	33.9	81.1	55.3	−31.2	72.9	15.0
25–34	32.7	47.1	40.1	−46.7†	−38.3	−41.8†
35–44	70.8	55.7	63.4	6.8	−18.4	−5.8
45–54	74.5	56.4	66.2	18.6	−38.1†	−13.8
55–64	70.1	57.0	64.1	−3.3	−27.7	−15.4
65+	137.1	124.4	130.9	−25.9†	−28.2†	−26.7‡
Total*	83.3	69.6	74.9	10.5	−16.8†	−5.9
Foreign born—in Canada 5 years or less						
15–24	85.5	42.1	65.4	73.4	−10.2	36.0
25–34	95.2	66.8	80.3	55.0	−12.5	16.5
35–44	80.4	137.1	105.5	21.3	100.7‡	56.8
45–54	33.5	112.6	72.6	−46.7	23.6	−5.5
55–64	167.8	0.0	73.5	131.4	−100.0‡	−3.0
65+	82.4	54.6	76.7	−55.5	−68.5†	−57.1
Total*	84.2	77.4	80.9	11.7	−7.5	1.6

* Based on population 15 years and over.

† Significant at 0.05 level.

‡ Significant at 0.01 level.

people suffered grave hardships in their native lands during the war and when the added stress of readjustment to a new environment is superimposed, the likelihood of a mental breakdown could be expected to be high. Moreover, if an illness occurs, lack of available home care and protection could increase the necessity for hospitalization, especially among males who often migrate without their families. These unfavorable conditions surrounding the recent immigrant could be expected to diminish with time as indeed was suggested by the lower admission rates for the Foreign-born with longer residence in Canada.

SUMMARY

1. An analysis was made of first admission rates involving 1,983 patients from Western Ontario who were admitted to two Provincial mental institutions during the years 1950 to 1952.

2. The general findings were comparable to those proceeding from other studies of this kind. Higher rates tended to be associated with urban residence; with single, divorced and separated marital status; with lack of more than 8 years' schooling and with recent immigration among the foreign born.

3. An attempt was then made to assess the possible influence of these variables, both upon the incidence of mental illness, and upon the need or desire to hospitalize the mentally ill. Because of their nature, some of the differences between rates could sensibly have been the reflection of variations in incidence, resulting from differences in the group levels of environmental stress and from a process of selection which may determine the general degree of stability among persons characterized by a particular variable. However, the evidence pointing to this kind of interpretation never became so convincing that the possible influence of differences in social pressure could be ignored. Among the aged, in fact, the latter explanation was favoured.

An Outline of Further Research

On the basis of certain observations made throughout the analyses, together with a general understanding of the nature of mental illness, it has been concluded that if social pressure for hospitalization causes one rate to exceed another, it does so, not simply through the creation of more admissions generally, but through the addition of *different kinds* of patients to the admission number. The behavioral symptoms of mental illness vary greatly in type and in severity. Some gross symptoms demand institutional care regardless of attendant environmental circumstances; others, under certain conditions, could be tolerated and either treated outside of a hospital or ignored. Social pressure is almost surely limited in its influences upon admission rates to those among the mentally ill who exhibit the latter type of symptoms. Admission rates for the more acutely psychotic probably measure quite accurately the incidence of illnesses of this kind.

A detailed symptom analysis based upon this hypothesis currently is being made. Admission rates related to symptoms, and symptom clusters, are being compared among population groups and it is hoped that the results will add to an understanding of the factors which lead to the hospitalization of the mentally ill.

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SOME CONSIDERATIONS OF THE RELATIONSHIPS OF EPILEPSY TO SCHIZOPHRENIA, THE PRIMARY BEHAVIOR DISORDERS, AND PSYCHOPATHY: A FAMILY STUDY [1]

JUDITH S. SCHACHTER

Introduction

The interrelations between epilepsy, schizophrenia, psychopathic criminal behavior and the primary behavior disorders constitute the focus of an increasing number of psychiatric investigations and speculations. The unusual advantage afforded by the records of Bellevue Hospital of following the "S" family through two generations prompted this study of all four disorders in one family. Data secured by the case study method was supplemented by electroencephalograms and psychological tests. This paper is focused upon the two paternal first cousins, Fred Jr. and Mike Jr., who were studied most intensively; supplementary data on seven other relatives are included.

Case Studies

1. Fred Jr. was a first-born normal infant with an uneventful postnatal development. His father left for the army when the boy was 18 months old, and his mother worked part-time while he was cared for by a maternal aunt. Fred Sr. returned when the boy was 3½, and the child reportedly said: "You don't live here, get back in the army." When Fred was 4 years and 4 months old, his mother was hospitalized for the birth of his sister, Doris. During this time he had his first grand mal seizure in which he shook all over, his eyes rolled up, and he bit his tongue. Returning 2 weeks later, his mother noticed a change in Fred; he was jumpy and dropped things. With phenobarbital he was maintained seizure-free until his fifth birthday. At that time a close friend of the family died and he had his second seizure, similar to the first, on the day of the funeral. The seizures continued to occur several times a week until he was controlled again with phenobarbital and Dilantin at another hospital. There an EEG, taken in June 1947, revealed a pathological record strongly suggestive of convulsive seizures of the grand and petit mal types.

In August, 1949, Fred was taken off medication and two months later developed sleep disturbances in which he pointed at the wall, shook his bed and cried "Go away." He became disruptive and restless in class, he seemed to lose control of himself and would not obey. Seizures began again in March, 1950 and although he was put back on medication he continued to be unmanageable in school, exhibiting unpredictable and impulsive behavior. He was admitted to the Childrens' Ward for the first time after he attacked his teacher.

Fred's behavior on the ward was friendly and responsive; he made contact easily. Despite this superficial normality he related many bizarre fantasies about the murderers living under the stairs of his apartment house who were fed by the superintendent. Because in this, as in many other areas, he failed to distinguish between reality and fantasy, he was discharged with a diagnosis of psychosis with epilepsy.

Fred adjusted fairly well to camp and school until the fall of 1951 when he became disturbing in the playground and was accused of setting fire to a school-mate's books in the hallway of an apartment house. On January 5, 1952 he attacked his classmates with a burned Christmas tree and ran around muttering to himself in a private war. Apparently at this time he also turned in a false alarm. He was readmitted to the ward shortly thereafter.

[1] The case work in this paper was carried out under the supervision of Dr. Lauretta Bender, Professor of Clinical Psychiatry, New York University-Bellevue College of Medicine, and with the assistance of Esther Stearns, R.N., and Joan Havel, Ph.D.

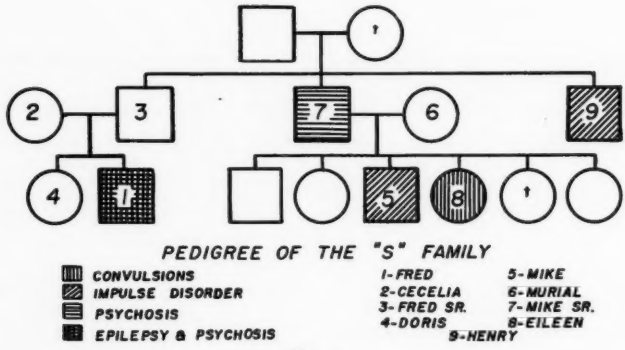

FIG. 1.

Physically, Fred was a slight, pale, delicate, infantile boy with a querulous, anxious expression. He was very hyperactive, darting away continually, but clinging and leaning at times. During interviews he chatted constantly with a flight of ideas, smiling and frowning dramatically, laughing inappropriately, lapsing into baby-talk and mimicking. He often discarded one story after another in pursuit of a fantastic detail, becoming upset and agitated when his stories were doubted. Almost compulsively telling tall tales, he could not control the overwhelming aggressive, destructive and death-centered fantasies he fashioned, nor could he ever get beneath the florid details to point out the true facts.

Fred's repeated EEGs have corroborated the original interpretation, and have confirmed the diagnosis of clinical epilepsy. While on Dilantin his record was abnormally slow for his age, but contained none of the spontaneous and hyperventilation-induced spike wave discharges seen earlier. Fred's early I.Q.'s of 89 were coupled with signs of better functioning on the Goodenough test. However, when he returned to Bellevue in 1952 his WISC score was 75 and his Goodenough had also fallen. The psychologist reported that his borderline intelligence and his educational retardation did not appear to represent a maximum performance. Marked fluctuations in attention, dramatization of responses, flight of ideas, as well

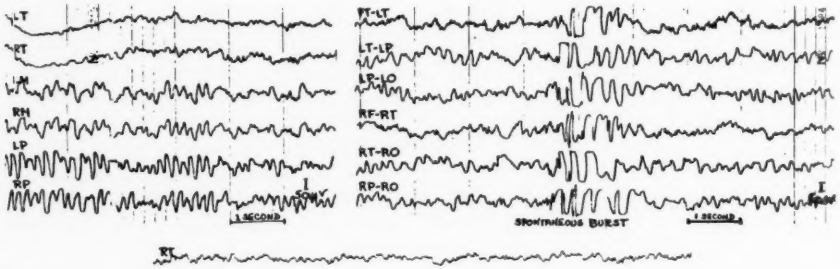

FIG. 2. (1) Fred S. Jr., age 8 years, resting record, no medication. (2) Age 8 year, resting record, spontaneous burst without movement by patient. (3) Retest—age 9 years 8 mos.—receiving Dilantin 0.1 gm. t.i.d.

as quick, uncritical and inadequate judgments which disregarded the restrictions set by reality were evident in his answers. His verbalizations were concrete and he showed a deficit in the area of conceptualization, as well as an inability to retain the usual associations. The Rorschach indicated a marked emotional liability with a potentiality for explosive outburst directed against the environment, as well as a fluctuation in productivity and overly facile and elaborate associations.

Evaluation of Fred's course led to the conclusion that, although he was seizure-free on medication, he belonged to that group of early epileptics who show signs associated with intellectual deterioration. His inability to distinguish fantasy from reality marked him as psychotic. Underlying both these trends were the signs of diffuse organic brain disease, namely: impulsivity, hyperactivity, overwhelming anxiety, and antisocial behavior.

2. Fred's mother, Cecelia, a short, faded, 44-year-old woman, left school after the seventh grade and went to work as a packer in a department store. There is no history of psychosis or epilepsy in her family; she has continued to keep in close touch with her many relatives, particularly her sisters. Although her EEG was within normal limits, it contained an accelerated alpha rhythm and large amounts of fast activity without any specific diagnostic or well-defined abnormality.

3. Fred Sr., 38 years old, was in the Army for two years and then became the chief bellhop of a good hotel. A quiet, controlled, withdrawn man, he boasts that he never shows any emotions, but keeps them inside. Unlike his wife, he is alienated from his family and would not discuss his two brothers, using his eighth grade education to justify his feelings of superiority towards them. Despite the fact that his EEG was slightly abnormal and dysrhythmic, containing excessive moderately slow and fast components, no full blown seizure activity of any type was obtained, although the moderately slow activity might be related to that in Fred's most recent record.

4. Doris, Fred's younger sister, gets on well at school and in the home where she is her father's favorite. Her hyperactivity and disorganization were reminiscent of many of the impulsive features of her brother's behavior, and her Bender Visual Motor Gestalts showed marked fluctuations in perception as well as execution which seemed to reflect variations in her impulsivity and control. Her concept of the human body, on the Goodenough test, was also considered bizarre. Although her EEG was poorly organized for her age, no specific abnormalities were present; interpretation was hindered by a poor recording. Features contained in both parents' tracings were observed, but there was no similarity to Fred's record. It was difficult at the time to evaluate Doris' psychiatric status, but her drawings, conversation, emotional lability and impulsivity made it impossible to consider her a normal child.

5. Mike Jr., Fred's paternal cousin, developed uneventfully until he was 6 months old. After that time his records present the picture of a child who was rarely out of the hospital. He was first admitted because of pharyngitis, tracheobronchitis, hypertrophied tonsils and an associated feeding problem, and after four months in bed he became aggressive and difficult to manage on the ward. Once home, his behavior became more and more bizarre. He screamed, bit, tore and broke everything, had frequent nightmares and episodes of rage. At 23 months he was seen in the Mental Hygiene Clinic and was noted to have good coordination and tone, although he had a right internal strabismus and an assymetrical face. Since the neurological examination revealed no deviations from the normal, and his I.Q. of 85 indicated no interference with intellectual functioning, it was felt that he did not present the picture of encephalitis in infancy. He was treated with luminal and referred to another hospital for a more complete neurological examination. There, although two infant intelligence tests were at least normal, his overactivity even in sleep, his rages and his aggressivity led to a diagnosis of encephalitis and he was returned to the Childrens' Ward at Bellevue shortly after his second birthday. Since his behavior there was not considered encephalitic in origin, he was referred to a day nursery where his behavior reportedly improved. At the age of 5 he was hospitalized for rheumatic fever on the pediatrics ward, but had to be discharged because he was unmanageable even on heavy sedation.

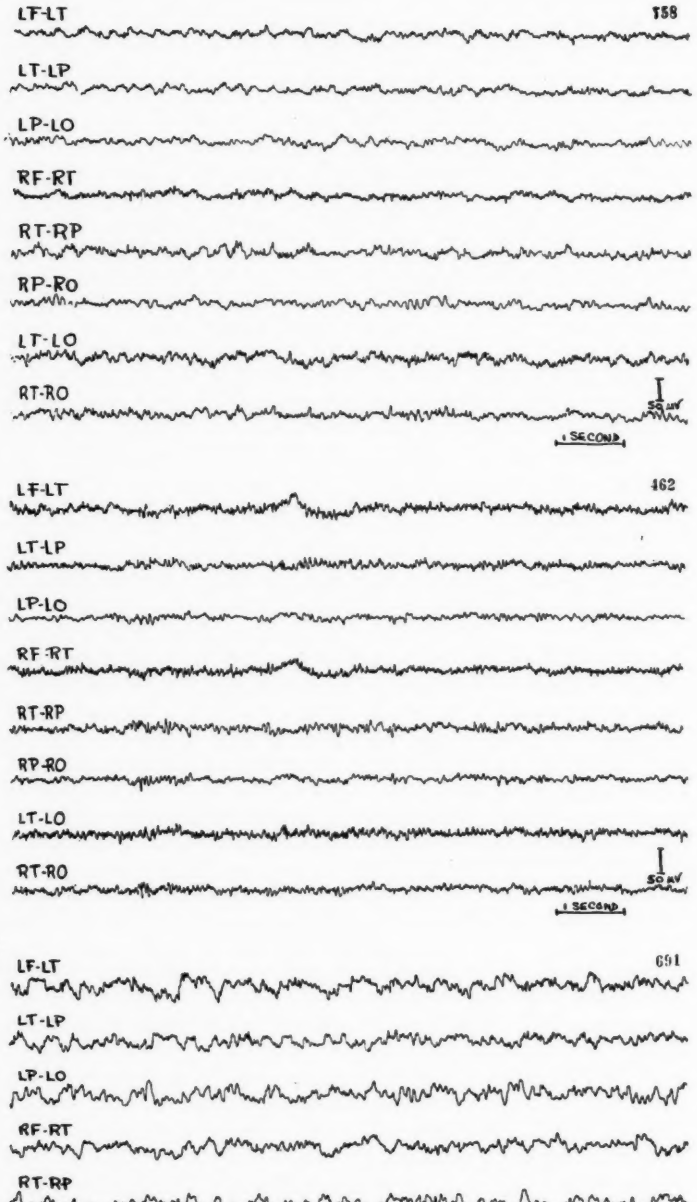

FIG. 3. (1) Fred S. Sr., age 36 years, resting record. (2) Cecelia S., age 44 years, resting record. (3) Doris S., age 5 years 6 months, resting record.

FIG. 4. (1 Mike S. Jr., age 9 years 9 months resting record. (2) After 30 deep breaths (35 seconds of hyperventilation). (3) Two minutes after cessation of two minute hyperventilation period; increased dysrhythmia and paroxysmal activity still persisting.

Mike made a fairly good adjustment in school. His I.Q. was 97, and he appeared well until March 1952 when the nurse noted that he was physically under par in appearance and had habitual jerky head and shoulder movements as well as increased activity in the classroom and school yard. She referred him to the Behavior Clinic when he tried to gouge out a boy's eye in a fight that culminated a period in which he had purposely banged his head against those of the other children and exhibited unpredictable and increasingly severe mood swings.

Physically, Mike was a small, dark boy who slumped defensively in his chair. There were no abnormal movements during the interview, but ocular convergence was poor and he appeared overcontrolled and quiet. He kept a strong rein on his emotional expression and speech and let his mother do the talking. An intelligence test showed that Mike's reading ability was up to his age level, but that his spatial reasoning and verbal activity were far below it. His Goodenough drawing indicated an average intelligence. The Bender Gestalts, although outlined in dark black, were inadequate for his age level, with particular failures on the angles of the diamond-shaped figures. Mike himself was vaguely dissatisfied with the results.

Mike's EEG was moderately abnormal for his age, containing a variable pattern of activity, intermittently paroxysmal in quality and consisting of moderately slow frequencies with fast components. The hyperventilation response was highly exaggerated and seizure-like in degree and of a type associated with the seizure disorders and/or hypoglycemic states. The record had a good representation of alpha activity and no spontaneous seizure discharges, but in many respects it was similar to Fred's.

Evaluation of the history and examination led to the conclusion that Mike exhibited a general disorganization of impulses due to both organic and psychogenic elements. The three factors which led to the diagnosis of organic brain disease were the pyogenic illnesses before the age of one year which were followed by the questionable encephalitis, the genetic factors indicated in his relationship to an epileptic cousin, a sister with seizures, a psychotic father and the abnormal EEG. Removal from his mother because of early hospitalizations, as well as the effect of his father's psychosis upon the home were considered the psychogenic factors.

6. Mike's mother, Murial, in her middle thirties, is a worn, nervous woman described by various agencies as of limited mental capacity and great dependence. Her life has been one of responsibility and hard work ever since she was abandoned by her parents at the age of 14. She assiduously takes her five children to clinics, and expresses her hostility by claiming that "All the S's are crazy!"

7. Mike Sr. is one year older than Fred Sr. and considered himself his mother's favorite, as well as her most devoted son. He was not on good terms with his father and said "Dad is sort of feeble-minded, I guess." He gave up his ambitions for the priesthood when he discovered the studies were too difficult, and instead married and began to run a hotel elevator when he was 22. Two years later he began to get shaking fits in the elevator and subsequently became so restless, fidgety and anxious that he was unable to leave the apartment. He was hospitalized and then went to the Mental Hygiene Clinic as an outpatient. He was unable to remain unaccompanied for any length of time, was afraid to leave his house, or return to it, and remained preoccupied and apprehensive about both his sexual fantasies and his fears that he would get so light that he would float away. He came to the clinic sporadically for several years, and then resumed a solitary life working as a moving man with a friend, still unable to leave the house alone or ride in public vehicles. Because of his paranoid ideas neither he nor his wife and daughters were able to come to the hospital for EEGs. The final diagnosis was latent schizophrenia.

The Mike S's had six children, five of whom are now living. The oldest daughter is well adjusted in high school, the second child died at 4 months of bronchopneumonia, and the two youngest are apparently well and normal.

8. The third girl, Eileen, now 14 years old, was seen in the Mental Hygiene Clinic when she was 1½ years old because of recurrent fits or spells. At one year of age she had suddenly appeared scared, stopped breathing, turned blue, stiffened, turned up her eyes and remained unconscious for about two minutes. The only previous illness had been bronchitis, for which she had been hospitalized; there was no history of virus diseases or accidents. The child was well nourished, with normal gait, neurological and physical examination, and appeared normally alert, with adequate speech development and comprehension. The skull circumference was 19⅝ inches, there was a bulging anterior fontales, and the fontanelles were closed. X-rays showed the bones of the vault to be of normal thickness; there were no intracranial calcifications and the sella turcica was normal. However, the convolutional impressions were accentuated in the lower parietal and temporal regions, and this abnormality enhanced the general impression of hydrocephalus with paroxysmal convulsive disease and average intelligence. Eileen was controlled on barbiturates for a few years and has had no seizures recently, although her school work is retarded.

9. The uncle of these children, Henry, is the oldest of the three brothers. He first came to the attention of the authorities when he was 22 and was charged with grand larceny. Two years later he was convicted of the drunken murder of a friend during a quarrel over money. In prison he was considered unstable, depressed but trustworthy; his mental age was 14 to 15 years on the Bregman Alpha A; he was pardoned in 10 years in the custody of his uncle, the chief of police. Subsequently he has had many arrests for drunk and disorderly conduct, petit larceny and violation of parole, and most recently, grand larceny. Apparently he has never been in harmony with the community since 1933; his impulsive and antisocial behavior has always brought him into conflict with the authorities.

Discussion of Cases

The "S" family presents the following picture: of the three brothers, the oldest, Henry is a recidivist, Mike Sr. is psychotic, and Fred Sr. has made a good, if rigid adjustment. In the next generation, three of the children are apparently normal, the remaining four are not. Eileen had convulsions early in life and is intellectually retarded; Mike has an organic behavior disorder; Fred has a psychosis with epilepsy, and Doris shows many bizarre impulsive features.

It is unlikely that "psychic contagiousness" is an etiological factor in the development of impulsive antisocial behavior in this family,

since we are not dealing with a cohesive family unit. Other psychological factors cannot be so easily regarded. The three brothers, Mike Sr., Fred Sr. and Henry grew up in a disturbed home. Their father was irresponsible and a poor wage-earner, their mother died when they were in their early teens. Undoubtedly family discord contributed to the problems common to the low-income group during the depression. Since the youngest boy, Fred Sr., managed to maintain an intact personality despite both the loss of his mother and life with his two unstable brothers, it appears that more than a dynamic interpretation is needed to explain these differences between the criminal, the psychotic and the compulsive normal.

In the next generation the same observation can be made. We find psychologically traumatizing incidents in the histories of both boys, followed by the development of abnormal behavior patterns to dissimilar stress. Fred was subject to the anxieties aroused by his father's return from the army and by further displacement from his mother's affections by his little sister's arrival. Mike had an even more unpleasant early environment of long hospitalizations and a disrupted home. Neither of these experiences was unique. In both cases, as in the previous generation, reactions appear more marked than one would be led to expect from the nature of the psychological stress. Fred has retreated from reality into psychosis; Mike, on the other hand, directs his uncontrollable energies towards active conflicts with the environment. Both Fred and Mike were referred to Bellevue because of aggressive behavior in school, and in both mood swings were prominent, and periods of relatively good adjustment contrasted sharply with violent impulsivity. These children may be considered to exhibit the multiple clinical as well as EEG signs of diffuse organic brain disease described by L. Bender.

The boys differ radically in their techniques for handling the anxiety which is a prominent symptom of the disease. Fred ignores the restrictions set by reality, and lives in the fantasy-world depicted in his drawing of a man, in which overly facile and elaborate associations are utilized to disguise the original hostile impulse (the dagger). Mike's overcontrolled, almost compulsive, stiff and motionless man results from his attempts to correct with erasures and heavy strokes the impulsive wayward lines, and to bind in the otherwise uncontrollable drives. Mike's defenses indicate the path that the child with organic brain disease takes when he successfully copes with his impulses. Suffering from a less severely disorganizing process than Fred, he also had a mother who supported him despite his aggressive, destructive behavior, and enabled him to find the mechanisms for adequate adjustment.

The case study of the "S" family poses several significant questions. Does the occurrence of epilepsy in the same family with psychopathy and a behavior disorder represent coincidence, or does it signify the presence of common inherited factors? Similarly, what is the relationship of epilepsy to schizophrenia? Finally, if an inherited predisposition can be demonstrated in the pathogenesis of these conditions, can we then decide if they are different phenotypical expressions of a single underlying disorder, different diseases partially linked genetically, or separate entities inherited independently? Before we attempt to draw any conclusions from the family study, we shall briefly consider some of the available literature.

Review and Discussion

One of the basic concepts of the family study is that of inheritance—the transmission of potential physical and mental properties from parents to their children through the genes. Only the predisposition or capacity to develop certain properties is passed on. While this transmission sets the limits of reaction to particular constellations of stimuli, there is at all times a dynamic interaction between a gene-specific dysfunction, other constitutional characteristics that modify the effect of the dysfunction, and the precipitating external stimuli. Environmental factors may arise independently of, and without relation to, the genetic limitation and so precipitate the disorder, or they may have their roots in the disease itself.

Although an inherited predisposition has been claimed for both the behavior disorders and psychopathy, most genetic studies have been done on epilepsy and schizophrenia. An

FIG. 5.

attempt will be made, in the following review, to correlate this work with recent electroencephalographic reports.

Epilepsy is a recurrent disturbance of consciousness, with or without muscular components, accompanied by changes in the electrical potentials of the brain (47). Since it is inherited as a gradual predisposition to abnormal susceptibility to various stimuli, convulsions are not the basic disorder and do not appear in all those who carry the affected genes. Thus, only 20 to 30 per cent of epileptics know of another epileptic in their own family (38, 39, 53), although many studies have shown that convulsive disease is 5 to 15 times more common in the blood relations of epileptic index cases than the 0.4 per cent expectancy of the general population (5, 32, 38) For

FIG. 6.

example, Bridge, Harvold and Stein each found epilepsy in approximately 4 per cent of the children and siblings, and 3 per cent of the parents of patients with cryptogenic epilepsy (5, 18, 53). It is interesting to note that persons manifesting their first seizure before 5 years of age have four times as many epileptic relatives as those whose first attacks began after 30 years (36). Early manifestation of the epileptic predisposition is apparently related to an increased vulnerability to inherited constitutional factors which is also shared by other family members.

Conrad, using the twin-index method, showed that the concordance figure for cryptogenic epilepsy was 86.3 per cent in monozygotic twin pairs, while it was only 4.3 per cent in dizygotic pairs (10). The American figures, while not so striking, point to the same conclusions (48). On the basis of the family

and twin-pair studies it was hypothesized that epilepsy is carried as a recessive Mendelian trait.

Investigations of the specific cerebral dysrhythmias of epilepsy manifested in the electroencephalogram have marshalled additional support for the role of heredity. Proof that the electrical activity of the cortex represents a constitutional characteristic has been obtained in twin studies in which remarkable similarities have been observed in the records of both normal and epileptic monozygotic twins (37). Since cortical rhythm is inherited, and specific patterns have been defined as characteristic of epilepsy, the EEG can be used to demonstrate the predisposition to epilepsy and to study its transmission.

Abnormal records have been found in approximately 12 per cent of the general population, in over 90 per cent of known epilectics (5, 32, 38) as well as in 50 to 68 per cent of their relatives. Further, 94 per cent of epileptic patients have at least one parent with an unmistakably abnormal record. Altogether, definite EEG abnormalities are six times as frequent among the relatives of patients as in the normal population, while the predisposition apparently outnumbers the disease itself in the ratio of 20:1 (38, 39).

Antecedent dysrhythmia is undoubtedly present in idiopathic epilepsy. It is also found in 12 per cent of the population which does not suffer from convulsions, but which may be considered predisposed to epilepsy or an allied disorder. The role of injury, for example, in the symptomatic epilepsies, emphasizes the fact that "cortical dysrhythmia, although a transmissible constitutional characteristic, is not laid down, like a finger print, in fixed tissues, but is functional and physiologic, an ever-shifting shadow of a disturbance of the fundamental electrochemical activity of the brain." If clinical epilepsy is a recessive Mendelian trait, as many believe, the antecedent dysrhythmia seems to Lennox to be a dominant trait, appearing in members of each generation according to well-defined, though poorly understood laws (38).

The EEG has not only broadened the concept of epilepsy, but has proved useful in the study of disorders of thought and behavior in subjects who have never exhibited a true convulsion, and whose only manifestations of organic brain disease are abnormal cerebral potentials, and the soft neurological signs described by Dr. Lauretta Bender. In these disorders, the organic damage prevents the organized patterning of impulses which further increases the basic anxiety, and prevents the integration of percepts into good gestalten. Consequently, the growing child develops false concepts not only of the external world but of the nature of his own self; the difficulty in controlling impulses makes the gratification of desires far more difficult, and the fulfillment of society's requirements almost impossible. The environment inevitably frustrates his efforts to gain social orientation through hyperkinetic activity, touching and biting, and is therefore regarded by the child as aggressive and hostile, and responded to in kind. The vague, unlocalized disturbance therefore manifests itself in increased difficulty in carrying out the usual life activities, by overreactions to environmental stimuli arousing anxiety and hostility, and particularly by failure to control antisocial impulses (3, 4).

Studies of children with behavior disorders admitted to institutions have revealed a 59 to 85 per cent incidence of abnormal EEGs (6, 16, 50, 54). The highest figure was reported from a state training school where the majority of the abnormalities were of the psychomotor type (8). Jasper, Solomon and Bradley found that 39 per cent of the abnormal EEGs in their patients were of the type seen in epileptics between attacks (27). Another study revealed that patients whose parents had abnormal EEGs had more than twice as many abnormal records as those whose parents had normal records. The distribution of the records of the children closely resembled that of the relatives of epileptics (16).

Those patients with hyperactive and impulsive behavior, highly variable and unrelated to environmental stimuli, were found to have abnormalities in 83 per cent of the records. Slow waves, under 8 per second, were the predominant disorder, and were considered a sign of poorly integrated cortical function related to a lack of maturation of parts of the brain (27). It was this abnormality that Lindsley and Cutts felt was the most distinguishing characteristic of the EEGs of the behavior

problem children they studied. These slow waves, more than twice as common in that group than in comparable normals, were interpreted as indicating a lower cortical threshold of excitation and a greater sensitivity to disturbances arising in the cortex (4). Children with behavior disorders therefore seem to show a physiological developmental lag manifested in the EEG which constitutes an inherited predisposition to the characteristic immaturity of social and psychological adjustment.

Surveys of criminal psychopaths also report that approximately half have abnormal EEGs, the number increasing markedly with associated aggressiveness or a history of childhood convulsions (7, 22). The predominant abnormality encountered, excess theta (4–7 cycles per second) activity (51, 52) is interpreted as suggesting physiological immaturity in the adult. The slow wave, together with the results of capillary microscopy, "suggested developmental anomalies and dysplasias at the morphological level" (52).

Hill and Pond found 18 epileptics in a group of 100 murderers, 32 times the incidence of this disorder in the general population. The highest percentage of abnormal records (77 per cent) was found in the group who had committed apparently motiveless or only slightly motivated crimes. The murders, however, were not committed during seizures or post-epileptic automatisms, although a fair proportion of these crimes were committed under conditions of physiological stress such as severe fatigue, starvation and alcoholic inebriation. It is interesting to note (see Case 9) that prisoners in this category with somewhat abnormal EEGs under normal conditions had even more bizarre records when the psysiologic stresses at the time of the crime were duplicated. The disturbed cerebral function was apparently potentiated by these factors (21).

Further studies have shown that psychopaths have increased amounts of the four types of EEG abnormality that Hill associates with "either direct failure of the maturational process to reach completion or to some aberrant form of the process." Despite the fact that there was a marked relationship between posterior temporal focal disturbances, which were associated with the greatest immaturity and the most dangerous aggressive and antisocial traits within the psychopathic group, Hill concluded that there was no EEG characteristic or group of characteristics related specifically to any group of patients (20). However, Adrian has pointed out that one must suppose that the particular configuration of the nervous pattern will determine a particular course of action (1). The immature EEG of the psychopath cannot be ignored.

The relationship of the primary behavior disorders to psychopathy is difficult to determine, since age operates as a separate factor and may determine the type of behavior irrespective of the EEG abnormality. Aggression, for example, is a more common defense in emotionally disturbed children than in emotionally disturbed adults. On the other hand, aggressive children have apparently a greater proportion of abnormal EEGs than do aggressive adults. Since both selected criminal psychopaths (20) and behavior problem children (17) give histories of "morbid heredity" in half the cases, and maturational lags have been claimed for both, Lennox has suggested that a large proportion of the nonadjustable population of psychopaths and delinquents suffer from a primary physiological disorder and that "presumably prisons harbor many persons afflicted not with moral turpitude but with disordered brain waves . . ." (37).

The EEG has enabled the psychiatrist to relate the impulsive antisocial disorders found in both children and adults to the group of physically more disabling disorders called the epilepsies. However, due to both clinical and EEG differences it is impossible with certitude to consider them as constituting one population. While the behavior disorders and psychopathy are apparently closely linked by heredity, constitutional immaturity and EEG, for the moment their relationship with the epilepsies must be considered as that of related populations with inherited EEG abnormalities as the common determinant. From this point of view, the convulsion may be considered as the most severe expression of the cerebral dysfunction which in milder form increases the sensitivity of the individual to various types of stimuli, including the emotional traumas of childhood, disorganizes his perceptions and prevents the integration of

new experiences. From the so-called subclinical epilepsies many of the children with behavior problems and the adults with criminal records are drawn.

The hereditoconstitutional factors in the origin of schizophrenia have not been as universally accepted as those for epilepsy. However, Rudin's theory that schizophrenia is inherited as a Mendelian recessive has been implemented by Kallmann, so this possibility must be seriously considered. Early morbidity studies indicated an increased incidence of the disease in relatives of schizophrenic index cases (29) and the twin-family method showed that the number of affected individuals increased with the degree of consanguinity to the index case; monozygotic twins had a morbidity rate of 61—85.9 per cent, while dizygotic twins had a morbidity rate of 9.9—14.7 per cent (28–31, 49). On the basis of these studies, Kallmann concluded that the predisposition to schizophrenia and schizoidia could be explained only by a specific recessive pattern of heredity transmission of an autosomal gene (28–31).

These studies are consistent with the concept of schizophrenia proposed by L. Bender, who regards the disease as a biological process determined before birth by hereditary factors and activated by physiological crises into the psychosis. The pathology and psychopathology pervade all areas of behavior controlled through the central nervous system, including motility, intellectual functioning, and personality development. The pathology strikes at the substratum of integrative functions or biologically patterned behavior so that primitive reflex activities may outlive the stage to which they belong. Growth problems become interrelated with psychological problems due to both the disease and the reactive anxiety (2, 3).

The relationship between epilepsy and schizophrenia has always been a subject of controversy. Five alternatives have been proposed to explain the relationship between the two diseases: 1) epilepsy may be a symptom of schizophrenia, since it occurs in 0.33 to 18 per cent of the cases (19, 44); 2) epilepsy and schizophrenia are mutually incompatible, Meduna's basis for his metrazol therapy (42); 3) epilepsy and schizophrenia are independent conditions, occurring together only by chance (23, 32); 4) epilepsy and schizophrenia are merely clinical syndromes, expressions of a similar underlying pathology (15); 5) psychosis may be produced by the altered cerebral metabolism resulting from repeated fits (45).

If the two diseases are genetically unrelated, only 1 in 200, or 0.5 per cent of schizophrenics should exhibit convulsions, and only 0.5 per cent of epileptics should show signs of schizophrenic psychosis. However, 12 per cent of the general population, and presumably of schizophrenics carry the gene for dysrhythmia which could manifest itself in a lower convulsive threshold in the early stage of insulin therapy or after withdrawal from barbiturates. While many studies of the EEGs of psychotic patients have shown a high proportion of dysrhythmias, paroxysmal activity and abnormal frequencies and voltages (9, 11, 15, 24, 26, 40), these do not provide conclusive evidence of the epileptic trait, and have led to conflicting reports and conclusions.

Hoch, for example, found no evidence of classical epileptic activity, but 35 per cent of his patients showed irregularities, many of which he classified with the psychomotor epilepsies. He felt, however, that the EEG evidence did not denote more than a chance relationship between schizophrenia and epilepsy (22). At the other extreme, Gibbs, Gibbs and Lennox have stated that both diseases were merely clinical entities; both were forms of pathological cerebral functioning. Since the majority of their patients had abnormal EEGs, many with records resembling those of epileptics with psychomotor seizures, as in Hoch's series, they concluded that the two disorders were merely different aspects of one physiopathological process (14). Kennard has objected to their line of reasoning and to a later conclusion "that 'psychotic symptoms' are 'indistinguishable' from those of psychomotor epilepsy" (33).

Other studies have fallen in between these two extremes. Jasper, Fitzpatrick and Solomon discovered that 23 per cent of their patients had clinical or EEG evidence of an epileptiform disturbance, although the alpha analysis did not bear out this affinity (26). Finley and Campbell, as well as Davis and Hurst, have found a predominance of rapid activity, although epileptics characteristically show pre-

dominantly slow activity in their records (11, 12, 15, 25). Davis discovered a "choppy" disorganization of low voltage in 61 per cent of her schizophrenic records, especially in the younger undeteriorated patients, which appeared to indicate poor synchronization and irritability associated with organic pathology (11). Hurst found "choppy" activity in a similar proportion of his records and felt that it resembled epileptic activity at a greatly reduced voltage, a difference of degree rather than of kind, since both were forms of disorganized overactivity. He felt this pattern was due to an organic brain lesion or chemical stimulation of the brain leading to a mixture of rhythms kept separate in the normal brain (25). Lemere's data entirely contradict these findings and he hypothesizes a weak diencephalon and unimpaired cortex (35), mentioning neither epileptiform or "choppy" records, nor the spike wave discharges in sleep considered characteristic of thalamic and hypothalamic epilepsy (14).

Hill pointed out that most EEG abnormalities, especially the gross slow waves and epileptic paroxysmal activity, occur almost entirely in catatonics, the group most susceptible to clinical epileptic phenomena. He found that a small number of patients with either histories of epilepsy in their families or a personal history of fits had EEGs with grouped fast and slow waves with spikes in varying combinations with paroxysmal increases in voltage which he considered diagnostic of epilepsy. This increased incidence of epileptic phenomena was considered to occur in that 12 per cent of schizophrenics who were genetically susceptible. Any affinity between epilepsy and schizophrenia was therefore a transient relationship found especially in catatonics who were predisposed by disturbed metabolism, dysrhythmic EEG or family history (19).

The incidence of psychosis, usually schizophrenic in type, in the epilepsies has been variously reported as occurring in 0.28 to 4 per cent of patients (5, 46). Many psychoanalytic interpretations have been made of these withdrawals from reality. On the other hand, Penfield claims that the mental symptoms of psychosis, unlike the automatism, are due to the alterations produced in the brain by the repetition of epileptic fits or by the associated metabolic alterations in the ganglion cells and neuroglia (45). This theory is similar to Hills' concept of the mechanism of the convulsion in schizophrenia.

Patients diagnosed as schizophrenics do not constitute a homogenous group. Efforts to separate them on genetic grounds (28–31) do not agree with the EEG findings (25), although the latter have shown that the preponderance of abnormalities are found among the catatonics. Here again, age, or duration of disease may operate as a separate factor; the majority of abnormalities are found in the young, undeteriorated patients (11, 19). Just as the epileptic dysrhythmias appear to decrease with age, so may those of schizophrenic disorganization. While the interrelationships between epilepsy, the behavior disorders and psychopathy have been elucidated through EEG data, the place of schizophrenia has not been made clear, possibly because the disease itself is not an entity.

From this exploration of the literature we can conclude that genetic predispositions to schizophrenia, epilepsy, the primary behavior disorders and psychopathy have been demonstrated. Moreover, the last three have been shown to be drawn from at least related populations and their occurrence together in this family makes it necessary to postulate an inherent disorganizing process due to the presence of an inherited organic brain disorder which increased the vulnerability of several of the individuals to environmental stresses, and which in two cases was also expressed in convulsions. In addition, cerebral dysrhythmias of varying degrees of specificity have been shown to be both inherited and present in all four diseases. The relatively unstable electrocortical patterns which have been demonstrated in several of the "S" family are an expression of the underlying brain disturbance which constitutes a predisposition towards their abnormal psychological reactions. However, it is still not possible to decide whether, in our multifactoral inheritance, it is the modifying genes which provide the pathways to the specific psychological disturbances, or whether each entity is inherited by itself. We are unable to decide whether the two presumed separate diseases, schizophrenia and epilepsy,

occur together by coincidence in this family, or whether both are different expressions of an underlying pathophysiological state in which the varied symptomatology is merely due to differing reactions to the inherited dysrhythmia. This final question has not been answered either by the study of the family itself or by reference to the data in other more extensive studies.

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THE BLOOD PRESSURE RESPONSE TO PAIN AND EMOTION IN SCHIZOPHRENIA

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INTRODUCTION

This study of the relative responses to pain and emotion in schizophrenia is based on the application of the cold pressor test to 15 controls, 36 schizophrenics and 10 other psychotics. In 31 of the schizophrenics and 7 of the other psychotics this was followed by measurement of the blood pressure response to emotion produced by talk designed to cause inner tension.

METHOD

The method used was H. H. Wolf's (22) modification of the original one of Hines and Brown (7). The subject was rested until a stable pressure reading was reached or, in the case of some of the schizophrenics, in whom it continued to fluctuate, for at least half an hour. The right hand was then immersed in water at 37°C. (to act as control for the cold) and blood-pressure readings taken every minute for five minutes; the hand was then transferred to water at 4°C. and the pressure again measured every minute for five minutes. The rise in blood pressure produced by the cold water immersion is hereafter referred to as the cold pressor response.

SIGNIFICANCE OF THE COLD PRESSOR TEST

Hines and Brown (7, 8), who first described the test, regarded the response as indicative of the liability to develop hypertension; those with rises of over 20 mm. systolic and 15 mm. diastolic were known as hyperreactors and potential hypertensives. This work was followed by the publication of numerous papers by other workers, some supporting this view but the majority disagreeing.

H. H. Wolf (22) reviewed the literature extensively. He noted that most observers had found the rise in pressure roughly proportional to the pain felt; and that lesions of the nervous system at all levels from peripheral nerves to psyche which abolished the appreciation of pain also abolished the cold pressor response. Examples of such lesions were cord lesions involving the sensory tracts, lesions of the posterior part of the internal capsule and hysterical anesthesia. He concluded that an intact pain pathway was essential for the presence of the cold pressor reaction. The evidence for this appears conclusive. He also said that the test provided a measure of sensitivity to pain: but this statement needs qualifying, as the amount of rise is also influenced by autonomic lability or impairment of sympathetic vasoconstriction. The size of the cold pressor response is therefore probably only roughly proportional to the pain felt.

THE COLD PRESSOR TEST IN NORMAL SUBJECTS

Large series have been reported, interest being mainly concentrated on abnormally large responses and few authors mentioning the number of subjects showing no rise of blood pressure. The figures of those that do, however, show that this was small.

Hines and Brown (7) found in 5000 normals that the average systolic rise was 16.2 mm. and diastolic 13.2 mm. Ayman and Goldshine (1) found that of 48 normals and 88 hypertensives 98 per cent showed some rise of pressure. Maxwell Jones (11) tested 48 subjects—some normal, others neurotic. All showed a diastolic rise, and only 2 (an anxiety state and a hysteric) showed no systolic rise. White and Gildea (21) tested 14 normals and 11 cases of anxiety state; all showed a rise except one case of anxiety (possibly associated with fainting, as a fall was recorded).

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Feldt and Wenstrand (4) in 350 normals found an average systolic rise of 16.09 and diastolic of 15.67; only 11.7 per cent had a rise of 8 mm. or less of either systolic or diastolic. Russek (17) found a systolic average rise of 21.4 and diastolic 15.0 in 200 normals. In common with several other authors he found slightly increased responses with age. Todd (20) in 88 university students found an average systolic response of 10.9 mm. and diastolic of all 11.6 mm. This slightly lower average is probably due to the subjects being younger. He found considerable rises when the test was repeated with water at 33°C. (showing the need for a control test with water at about this temperature).

The consistency of the response is variously reported. In their series (the largest reported) Hines and Brown found only a 10 per cent variability, but other authors have recorded less consistent findings. Some have noted falls instead of rises, but these cases were nearly all associated with fainting and may be ascribed to the autonomic factors then brought into play. Ayman and Goldshine (1) and others have noted that the maximum blood pressures attained during repeated tests are reasonably consistent, though the actual rises do vary—which suggests that basal pressures have not always been reached before the test.

It is of interest to note that the latter authors found that small amounts of sedatives increased the response but amounts large enough to cause drowsiness or unconsciousness abolished it. Reid and Teel (15) confirmed this finding, which suggests that small doses of sedative act as an abreactive drug releasing emotional inhibition, while large doses impair pain response by disturbing consciousness.

Summing up the findings of these various workers, it may be said that the average rise of blood pressure (systolic and diastolic) is 15 mm., that it increases slightly with age, shows some actual variability but is fairly consistent when related to the basal pressure, and is almost invariably present in normal subjects.

The Cold Pressor Test in Hypertension

There is no doubt that the response is increased in hypertension (5). Discussion of this is outside the scope of this paper.

The Cold Pressor Test in Psychiatric Disorders

Little has been written on this subject. Reider (16) tested 19 schizophrenics, 12 manic-depressives, 4 other psychotics and 16 neurotics, taking as standard the figures of Hines and Brown. He gave no figures or details of illness, merely dividing responses into normal and hyper-reactive. Average results were normal, but it is of interest to note that he recorded that 5 of the schizophrenics gave a diastolic rise only. Igersheimer and Stevenson (10) tested 7 schizophrenics and 4 manic-depressives before and after E.C.T., finding no significant change but noting that the responses were, on the whole, lower than normal. White and Gildea (21) obtained the results shown in table 1.

They did not classify the psychotics, but remarked that one of them, a schizophrenic, was the only case in their series to show no rise of pressure.

These writers studied the cold pressor test as a test of autonomic function rather than as a reaction to pain. Numbers are small, there are few controls and psychotics are taken as one group; but the results, as far as they are of significance, suggest that some psychotics have a smaller response than normal.

Maxwell Jones (11) tested 10 anxiety

Table 1.

	No. cases	*Average systolic rise*	*Average diastolic rise*
Controls	14	21	39
Psychotics without tension	9	15	14
Anxious non-psychotics	11	22	13
Psychotics with tension	5	18	15
Hypertensives		50	24

cases, 8 hysterics and 10 cases of effort syndrome. Results were normal (apart from the absence of response in one case of anxiety and one of hysteria as mentioned above). Sullivan (19) and Cable and Smirk (3) found the cold pressor response present in 5 cases of hysterical anethesia, but H. H. Wolf (22) found it completely absent in 4 other cases. (During the present investigation it was found possible to abolish the response in a suggestible subject by means of hypnosis).

Becker *et al.* (2) found considerably increased responses in cerebral arteriosclerosis—i.e., 23 mm. systolic and 35 mm. diastolic.

Blood Pressure in Psychiatric Conditions

It is well known that temporary but considerable rises of blood pressure can result from emotion; this has been demonstrated in a number of studies of neurotic patients.

Mackenzie Shattock (18) reviewed the literature relating to blood pressure in schizophrenics. She quoted several authors who found the pressure on the whole lower than normal, the highest being in paranoid cases, the lowest in catatonics. She recorded a rise in systolic and diastolic pressures in 8 asthenic female catatonics coinciding with clinical improvement following treatment with sodium chloride and Doca.

Reaction to Pain in Schizophrenia

Malmo (13) applied the pain stress test (the subject pressing a button when heat applied to the forehead became too painful) to 17 schizophrenics and found that they both pressed the button and withdrew less frequently than other groups. May (14) found a high incidence of diminished pupillary response to pain, light and muscular effort in schizophrenia.

The Present Series

The cold pressor test (by the method of H. H. Wolf described above) was applied to 15 controls, 36 schizophrenics and 10 other psychotics.

The controls consisted of 9 men and 6 women, of average age 31. In 6 of these the test was repeated; in 2 cases the systolic response varied by 8 mm., otherwise the differences in readings were small.

The 10 cases of psychotics other than schizophrenics were ones in which the diagnoses were well established.

The 36 schizophrenic cases were taken from as wide a range of age, type of illness and duration as possible. The ages varied from 15 to 73 (mean 34.6), the duration of illness from 5 days to 36 years. The series was confined to cases which had been diagnosed as schizophrenia by several doctors; all (except when mute) showed evidence of typical thought disorder and none showed clouding of consciousness, marked affective features or other atypical symptoms. As far as possible they were divided into the classical groups—paranoid, catatonic, hebephrenic and simple. The unclassified group included the cases which did not fit into any of the above categories, and also several of long duration in which deterioration was too great to distinguish the original features.

The control and schizophrenic cases have been compared statistically. Cases with blood pressures of over 170 systolic or 100 diastolic were eliminated from both groups, since hypertension is known to increase the cold pressor response. Average resting blood pressures were almost identical in both groups. The schizophrenics had a slightly greater average age (34.6 as compared with 33.7 in the controls) and a greater age scatter; but these differences could bear only a negligible effect on the cold pressor responses. The group of "other psychotics" was for various reasons unsuitable for statistical presentation.

In the control series the blood pressure at rest showed a steady fall until a level was reached. Oscillations after the lowest point was reached were negligible in the control readings, being in no case more than 5 mm. This variation was more marked in the cases of non-schizophrenic psychosis — apparently varying, as one would expect, with the emotional state of the patient, being most marked, for example, in the more excited of the two cases of mania tested. In the schizophrenic cases the degree of oscillation varied considerably. In 22 it was small or non-existent; in 16 it was marked. In several cases this oscillation continued for an hour or more, the blood pressure never settling for more than five minutes. The presence or degree of these oscilla-

TABLE 2.—Resting Pressures, Variations and Cold Pressor Rises of Controls

Case No.	*Age*	*Sex*	*RS*	*RD*	*SV*	*DV*	*SRC*	*DRC*
1	34	M	125	70	3	0	10	10
2	30	M	128	85	0	0	24	25
3	20	F	123	70	0	0	9	5
4	37	M	120	65	0	0	20	20
5	33	F	115	75	0	0	7	10
6	29	M	110	80	4	2	10	12
7	45	M	135	95	0	5	15	20
8	36	M	112	70	0	0	13	25
9	29	M	138	90	4	2	22	27
10	35	F	112	65	4	0	13	10
11	46	F	158	100	0	0	10	10
12	18	F	125	70	0	0	5	10
13	36	M	150	100	0	0	8	15
14	31	M	115	75	0	0	0	15
15	46	F	140	90	0	0	20	30
Average	33.7		127.00	80.0	1.0	0.6	12.4	16.2

Explanation of abbreviations used in tables:
RS, resting systolic pressure.
RD, resting diastolic pressure.
SV, variation in the resting systolic pressure.
DV, variation in the resting diastolic pressure.
SRC, systolic rise on cold stimulation.
DRC, diastolic rise on cold stimulation.
SRE, systolic rise on emotional stimulation.
DRE, diastolic rise on emotional stimulation.

tions bore no relation to the size of the cold pressor response.

It was noticed that the oscillations in the resting pressure of the schizophrenics appeared to coincide with periods of mental activity, shown by muttering, turning the head or change of expression. This suggested to us that it would be of interest to record the blood-pressure response to stimulation of emotional processes; and in the rest of the schizophrenics (29 cases) and in 7 of the other psychotics this was done, verbally or by gesture, as discussed later. The results of this series are set out in tables 2 to 6.

TABLE 3.—Resting Pressures, Variations, Cold Pressor Rises and Response to Emotion of Other Psychotics

Case No.	*Age*	*Sex*	*RS*	*RD*	*SV*	*DV*	*SRC*	*DRC*	*SRE*	*DRE*	*Diagnosis*
16	33	F	135	85	0	0	10	5	0	0	Recurrent endogenous Depression
17	61	M	120	75	0	0	30	20	8	5	Chronic depression
18	55	F	115	70	13	5	25	15	15	5	Recurrent mania
19	42	F	105	78	0	2	33	24	—	—	Involutional Depression
20	53	F	200	110	5	7	15	7	40	20	Depression
21	22	F	138	75	5	0	20	25	—	—	Mania
22	50	F	188	125	3	0	10	5	10	5	Endogenous Depression
23	64	F	195	100	3	2	15	8	0	0	G. P. I.
24	62	F	128	65	4	5	12	15	—	—	Huntington's chorea
25	85	F	180	100	0	0	30	15	0	0	Senile dementia
Average			150.4	88.3	3.3	2.1	20	13.9	10.4	5.0	

See note below table 2.

TABLE 4.—Resting Pressures, Variations, Cold Pressor Responses and Response to Emotion of Schizophrenics

Case No.	*Age*	*Sex*	*RS*	*RD*	*SV*	*DV*	*SRC*	*DRC*	*SRE*	*DRE*	*Diagnosis*
26	47	F	100	65	12	5	18	10	28	20	Unclassified
27	38	F	145	95	17	4	0	0	—	—	Unclassified
28	19	M	128	75	10	4	2	5	17	10	Unclassified
29	24	M	170	85	3	0	0	10	—	—	Unclassified
30	38	F	160	100	20	10	25	5	45	15	Unclassified
31	29	M	130	65	5	0	0	0	10	3	Unclassified
32	20	M	120	80	0	0	0	0	10	5	Unclassified
33	25	M	115	80	2	0	0	0	—	—	Unclassified
34	22	M	138	80	0	0	2	0	17	15	Unclassified
35	15	F	120	75	2	0	2	0	12	5	Unclassified
36	19	F	135	70	0	0	19	30	27	10	Simple
37	40	F	132	80	0	0	3	5	0	0	Simple
38	40	F	115	75	10	5	13	15	—	—	Simple
39	45	M	130	85	4	0	0	0	14	5	Hebephrenic
40	57	M	124	75	0	0	5	0	25	10	Hebephrenic
41	20	F	110	60	0	0	0	0	27	15	Hebephrenic
42	19	M	135	75	7	5	0	0	13	5	Hebephrenic
43	36	M	150	80	5	0	0	0	14	10	Hebephrenic
44	73	F	140	70	8	5	0	0	10	5	Hebephrenic
45	27	M	155	80	10	5	0	0	—	—	Hebephrenic
46	59	M	125	70	10	5	0	0	0	0	Hebephrenic
47	25	M	112	75	0	0	0	5	14	15	Hebephrenic
48	37	M	98	65	0	0	14	15	14	15	Catatonic
49	46	M	125	90	0	0	10	5	15	5	Catatonic
50	27	M	138	80	10	15	7	5	27	15	Catatonic
51	29	F	100	60	0	0	5	5	10	12	Catatonic
52	53	F	115	80	0	0	0	0	10	10	Catatonic
53	18	F	112	70	0	2	3	5	—	—	Catatonic
54	19	F	122	82	4	5	13	13	10	0	Paranoid
55	33	M	108	70	2	0	22	25	—	—	Paranoid
56	60	F	150	80	15	10	0	0	15	0	Paranoid
57	37	F	130	85	0	2	10	10	0	0	Paranoid
58	42	M	110	68	0	0	15	12	5	4	Paranoid
59	31	F	115	55	0	0	10	15	10	15	Paranoid
60	37	M	140	80	10	10	10	5	5	15	Paranoid
61	38	M	148	80	10	10	4	5	7	10	Paranoid
Average	34.6	—	127.8	76.1	4.8	2.8	5.9	5.7	14.2	8.6	

See note below table 2.

Discussion

13 of the schizophrenic cases (over 1/3) showed no cold pressor response, and including these 23 cases (nearly 2/3) showed a rise of 5 mm. or less, either systolic or diastolic. All the controls and other psychotics showed a greater rise. The average response of the schizophrenics was significantly lower than that of the normal controls (the differences between the means of systolic and diastolic pressures being respectively 3.1 and 4.5 times the standard error). When hebephrenic cases alone were compared with the control series this difference was of very high statistical significance (6.5 and 7.6 times the standard error). On the other hand the responses of paranoid cases showed no significant difference from the controls. Again the paranoid cases had very much greater responses than the hebephrenic (4.1 and 3.6 the standard error).

Failure of blood-pressure response to pain-cold may be due to a defective afferent system —e.g., lesions of the pain pathways; to defective appreciation of pain, as in congenital indifference to pain (12); or to a defective efferent system. There was no evidence of disorder of the afferent system in any of the

TABLE 5.—COMPARISON OF AVERAGES

Group	*RS*	*RD*	*SV*	*DV*	*SRC*	*DRC*	*SRE*	*DRE*
Controls	127.0	80.0	1.0	0.6	12.4	16.2	—	—
Other psychotics	150.4	88.3	3.3	2.1	20	13.9	10.4	5.0
Schizophrenics	126.1	76.1	4.8	2.8	5.9	5.7	14.2	8.6
Hebephrenics	131.2	74.4	4.9	2.2	.56	.56	14.7	8.1
Paranoid schizophrenics	131.9	75.0	4.9	4.7	10.5	10.6	7.6	6.3

See note below table 2.

cases in this series, all having been found neurologically normal. An intact efferent system was shown by the efficient autonomic control demonstrated by the response to emotion seen in 25 of the 29 so tested. It may therefore be inferred that in those schizophrenics who showed an absent or impaired response to cold-pain the defect is at the highest level—i.e., the level of appreciation—and therefore that a high proportion of schizophrenics show an impaired appreciation of pain. It is of interest to note the attitude of these patients to the test. All the controls when questioned reported varying amounts of pain and some complained spontaneously of severe pain. None of the schizophrenics who showed no response to cold complained spontaneously of pain, though several commented on the cold, and of the few who were questioned directly about pain none admitted to feeling any. For example case 33 said, "The hot water felt hot and the cold cold," and case 43, "It's cold." On the other hand case 55, who showed a normal response, agreed that it was painful.

In the past few years much attention has been paid to the emotional aspects of pain. Reviewing the subject Wolf and Hardy (23) pointed out that there are two allowable concepts of the nature of pain. It may be considered as a specific sensation or as a 'feeling state.' Schizophrenic response to pain can best be understood when the latter concept is accepted. In those showing a deficient response to the cold pressor test a painful stimulus from the outside world fails to produce this state.

A curious feature of the present findings was the variability of response among the schizophrenics. All the nine hebephrenic cases showed an absent or slight response and most of the paranoid (6 out of 8) showed a normal one. Generally the latter had well-preserved personalities and a good contact with reality. However, not only the 'unclassified' but the catatonic group showed markedly varying responses. One might have expected that the latter, among whom are the most withdrawn of patients, would have shown the least response. But, for example, cases 48 and 49, with histories of 16 and 20 years respectively, both mute, completely withdrawn and showing flexibilities cereas, had normal responses. Results were not related to length of history or resting blood pressure and we could find no differentiating factor between those that showed a response and those that did not.

Of the 29 schizophrenic cases stimulated emotionally only 3 showed no response and one a response of 5 mm. or less; these 4 cases fell among the first 9 so tested and their lack of response may have been due to the inexperience of the investigators. In general it was found that discussion of the patients' schizophrenic world—their delusions and hallucinations—produced little or no response. They responded far more when their problems in the real world were discussed, especially when these had been connected with the onset of their illness. Parental relationships particularly were noted to cause a response; after this the most effective stimulus was simple interpretation of withdrawal. Case 52 was of interest

TABLE 6.—STANDARD DEVIATIONS OF CONTROLS, SCHIZPHRENICS, HEBEPHRENICS, AND PARANOID SCHIZOPHRENICS

Group	*SV*	*DV*	*SRC*	*DRC*
Controls	1.73	1.41	7.0	7.69
Schizophrenics	5.66	3.97	7.3	7.36
Hebephrenics	—	—	1.66	1.66
Paranoid Schizophrenics	—	—	6.12	7.66

See note below table 2.

in that she had been mute for many years and lay throughout the test repeating a stereotyped gesture of putting a hand over her mouth. She showed no response to talk, but when one of the observers began to imitate her gestures she looked agitated and her blood pressure showed a definite rise. To sum up: it was felt that patients showed a blood-pressure response to emotional stimulus only when the barrier between their schizophrenic world and reality was to some extent invaded. It was also noted that the response was very transient; in 1 or at most 2 minutes after stimulation was stopped the pressure had returned to normal.

Controls and schizophrenics showed significant differences in the oscillation of their resting blood pressure (oscillation being measured by the amount of rise after the lowest point had been reached). Differences between means were 3.7 times and 2.9 times the standard error for systolic and diastolic pressures respectively.

Conclusions

1. Definite conclusions

The average reaction of schizophrenics to the cold pressor test is significantly lower than that of normal controls. This lessening of response is most marked in hebephrenic cases and absent in paranoid ones. That this loss is not due to a defect in autonomic response is shown by these patients' response to emotional stimulus. The loss is apparently due to to an altered emotional organisation.

2. More speculative conclusions

The cold pressor results seem to reflect the observation—long made—that paranoid cases have superficially better preserved personalities and are in better contact with their environment than other schizophrenics.

It is tentatively suggested that the ratio of cold-pain response to that produced by discussion of inner problems represents an objective measure of the degree of withdrawal or preoccupation with inner life. Possibly the cold pressor test might be an additional help in the diagnosis of schizophrenia, an absent or very small response combined with a lively reaction to emotional stimulus would be common in schizophrenics and rare in other psychoses; but the numbers tested are too small to justify conclusions, and borderline cases were necessarily excluded from the present series. It might also be of interest to find if there is any correlation between cold pressor results and response to treatment—particularly insulin and leucotomy.

3. Conclusions compared with others

Many writers have recorded somatic changes in schizophrenia. These mainly consist of hyporeactivity or instability. The conclusions drawn vary. MacKenzie Shattock (18) believes that vascular deficiency may facilitate the mental and physical changes of catatonic withdrawal and she regards catatonic remission as a complex psychosomatic event. Hoskins (9) believes that there is a loss of adaptive efficiency in schizophrenia and says, "possibly the effort needed for organic adaptation leaves too little left for social adaptation." This view seems to imply a primary somatic change. Our findings would fit into the concept of MacKenzie Shattock but not into that of Hoskins. There is also a third concept possible: that the somatic changes are secondary to primary psychological changes.

Summary

The cold pressor test was applied to 15 normal controls, 36 schizophrenics and 10 other psychotics. In 29 of the schizophrenics and 7 of the other psychotics the blood pressure was recorded during discussion of their problems.

It was found that though the cold pressor response was present in all the normals and 'other psychotics' it was absent in 13 of the schizophrenics and small in a further 9. Of the 29 schizophrenics emotionally stimulated, 25 showed a concurrent rise of blood pressure. Statistical comparison was made between the control and schizophrenic groups, and showed that the average cold pressor response of the controls was significantly greater than that of the schizophrenics. This difference was very marked when the hebephrenic cases were separately compared with the controls. On the other hand, the paranoid cases by themselves showed rises not significantly different from the control series.

These findings are discussed.

Addendum

Since this paper was written the work of Glaser (6) has come to our notice. He was investigating the effect of frontal topectomy on autonomic nervous stability in schizophrenia and found that the cold pressor response was diminished in cases of hebephrenia but was normal in paranoid schizophrenia. This accords with our findings. He further found that after operation the response was on the whole less in the paranoid cases but increased sufficiently in the hebephrenics to bring them into the normal range. These changes can well be interpreted in the light of our results. It seems reasonable to assume that in the hebephrenic group release of emotional tension by operation allows better contact with the external world; but in the paranoid cases, preoperatively less withdrawn, the cold pressor response is diminished due to the emotional blunting resulting from topectomy.

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MANIC-DEPRESSIVE PSYCHOSIS IN A 13-YEAR-OLD BOY: PSYCHOLOGIC TEST FINDINGS [1]

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INTRODUCTION

Considerable important work has been done in the area of the psychoses of childhood (4, 6, 8, 10, 12–15, 21, 24, 25). This work, however, has dealt almost exclusively with childhood schizophrenia. Reported cases of manic-depressive psychoses in children under the age of 15 are rare. Of 53,535 first admissions to the New York State mental hospitals in the 3-year period 1947-1950 only 2 cases of manic-depressive psychoses under the age of 15 were reported: 1 male and 1 female. During the same period there were 146 males and 95 females under the age of 15 who were clinically diagnosed as dementia-praecox. The national statistics (1947) reports only five cases of manic-depressive psychosis below the age of 15 out of a total of 76,315 first admissions to mental hospitals.

Our aim in this paper has been to present the essential data together with our interpretations of them. The battery of test administered to Eric, the pseudonym given our patient, included the Wechsler intelligence scale for children, Porteus maze test, the Rorschach, Symond's picture story test, Bender visual-motor gestalt test and the Machover figure drawing test. Eric's course was followed closely by the writers during the six months period covered by this study. In addition to the usual testing sessions, we saw him in numerous private interviews and visited him, on two occasions, during the acute phase of his disturbance in his seclusion room.

FAMILY HISTORY

The patient's father has had seven admissions to three different state hospitals. His first admission occurred in 1928 at the age of 15. He has been consistently diagnosed manic-depressive psychosis-manic.

There is no history of mental illness indicated in the mother or the mother's side of the family.

PERSONAL HISTORY

Eric was born by caesarean section on January 29, 1938 at a general hospital in Maine. His development and educational progress appear to have been normal. He has one brother, aged 8, who is making a normal adjustment. His teachers report that Eric was very much interested in drawing and was an average student. There were times when he seemed to have difficulty in concentrating. His art teacher stated that "Eric is about the most outstanding art student I have ever had. His drawings and paintings, while a seventh grade student, were extremely creative and contained action."

A report from the police indicates that on April 8, 1947 Eric was involved with another boy in "indecent practices." Also, he was involved with a little girl in his cellar. The record states that he took off her panties but that nothing further transpired at that time. On July 16, 1951, Eric was charged with aggravated assault on a 4-year-old girl at his home. He first bought her an ice cream cone and then brought her to his home. He removed all her clothes, tied her hands behind her back and was about to cut her hair off when he heard his mother returning.

Eric was examined by a child psychiatrist who reported that he was a very disturbed boy and referred him to a home, situated near a large city in Maine, which treats emotionally disturbed children. Eric remained here for a month where he was described as being "fresh and inclined to be disobedient and filthy in his language." Home authorities state that "it was impossible for us to adequately supervise him because of his hyper-activity and he frequently wandered from the prescribed areas of the institution." While at the home the barn burned down and Eric admitted setting the fire.

[1] The authors express their appreciation to Dr. Francis H. Sleeper, the late Dr. Harry Elkins, and Miss Nina McClellan, for their encouragement and constructive criticisms throughout this study.

Eric was then sent to the State School. The Director of the State School states that he first behaved well. However, he soon began to write in his books; began climbing over chairs and desks, and would insist upon doing various exercises during school hours. His teacher found it difficult to manage him. He was sent back to his cottage where he talked and sang all night long. He began to speak incoherently and would complain of "spiritual troubles" and of "having done evil."

On December 3, 1951, Eric was transferred to the Augusta State Hospital for observation and treatment.

Hospital Course

Soon after admission Eric broke a window on the ward. His doctor reported that he was hyperactive, irritable and showed a definite flight of ideas. Then for several days Eric was relatively cooperative with ward routine.

Physical examination of Eric revealed a lad of 5' 1" in height and 94 pounds in weight.

He was diagnosed manic-depressive psychosis by the hospital staff. It was necessary subsequently to have Eric put in seclusion for short periods of time when he would become overactive, mischievous, and destructive.

On one occasion, Eric had been in seclusion for several hours when the writers visited him. Before entering the seclusion room we looked through the glass and saw the patient, with his back to the door, completely nude, throwing a mattress around the room and beating it violently against the floor. When we entered the seclusion room, Eric recognized us and was very congenial. He stated that St. Christ controls his mind. He then proceeded to fold his mattress, beat and squeeze it and said that the devil was inside. "Man is born in sin." Eric stated that he felt very strong. He then sat on the mattress and said that he was sitting on an atom, and then it quickly turned into an elephant; a magic carpet; a cat. He said that he preferred being alone in seclusion where he could not get into trouble. Patient went on to say that everybody here was against him except one other patient who, he said, was the only one who listens to him.

Behavioral Aspects

During the intelligence test Eric experienced an emotional outburst. He cried, sobbed, trembled all over and beat his fists on the table. The following is an example of his spontaneous verbalization: "Mr. Jones (cottage master) beats kids with flexible iron—grabs 'em by the throat; he is a German rat—no mercy—kill me—he should be done away with —he is unmerciful—rat—evil—he is irresistible—slaying—too much evil in him—he'll kill me—I'll kill him. That's how the boy got his sickness—he choked me—he break me. How can I behave myself in that evil place—he is German—unmerciful—he crush me to a pulp —I'll crush him. I pity him if he beat me again. He kill everyone he touch—take his cane—wrap it around me—twist." (At this point Eric demonstrated how said Mr. Jones wrapped the end of his cane around his neck and twisted it.) "I can't stand it no more—he'll kill me. He beat me with a cane of grain wood with iron inside. He is a boa constrictor—a rat. He crush me—he break my rib. If I have to go back and face him I am going to kill him." When asked by one of the writers if he had any friends at the school he replied, "No friends—everybody hate me down there—all against me—they hate me. Mr. Jones is a blood sucker. The boys are dirt—filth—they play with themselves—they treat the boys like filth." Eric, at this time, appeared very panicky and wept profusely.

Test Analysis

Wechsler. The results of the psychometric examination, by means of the Wechsler intelligence scale for children, place Eric in the average category of general intelligence (table 1). His extreme intra-test scatter and inter-test variability are indicative of tension, anxiety,

TABLE 1.—Test Findings: Wechsler Intelligence Scale for Children (12/6/51)

Verbal scale I.Q.	89
Performance scale I.Q.	100
Full scale I.Q.	93

Verbal Sub-Test	*Weighted Score*		*Performance Sub-test*	*Weighted Score*	
Information	8		P.A.	7	−
Comprehension	6	−	P.C.	9	
Digit Span	10		B.D.	16	+
Arithmetic	8		O.A.	11	
Similarities	8		Coding	7	−
Vocabulary	9				

emotional blocking, and fluctuations in energy level.

His verbal abilities are generally at a dull normal level while his performance abilities are average for his age group. His common sense and judgment in ordinary social situations, both theoretical and practical, are relatively poor. He tends to be distrustful of the statements of adults. For example: to the question, "What would you do if you were sent to buy a loaf of bread and the grocer said he did not have any more?" Eric replied, "See if he's just saying that; maybe he did have some. Look around."

Flight of ideas occurred on the arithmetical reasoning sub-test. To the problem, "A workman earned $36, he was paid $4 a day. How many days did he work?" Eric said, "Nine; two cents a pack—three cents a pack."

On the similarities sub-test, a measure of conceptual thinking, he gave good responses along with inadequate and bizarre ones. In what way are liberty and justice alike? "Liberty is freedom. Justice—do just as you want in America—Justice of the Peace." He often failed easy items and passed more difficult ones.

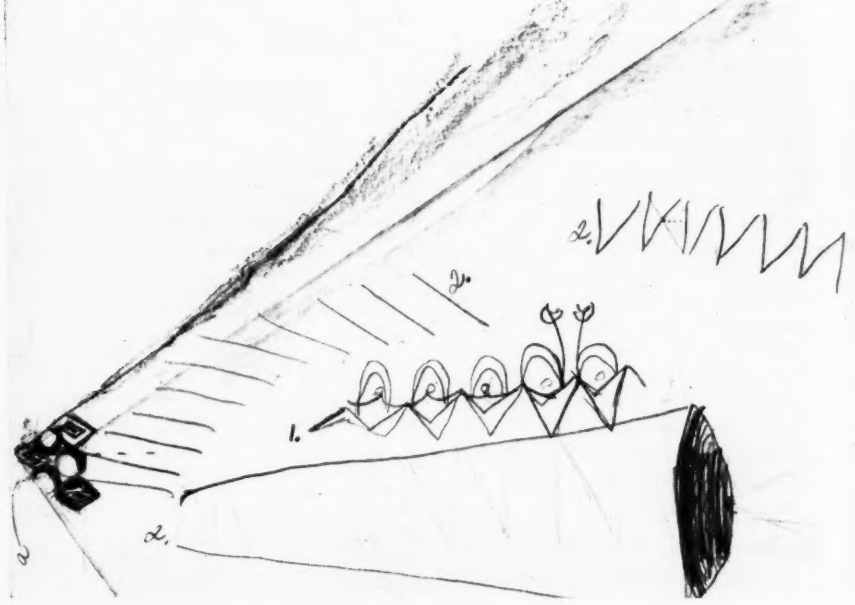
On a test measuring his ability to learn new material under time pressure his performance was also poor, being greatly affected by strain and tension. His attention fluctuated and concentration showed impairment. He was unable to repeat more than three digits backwards. He has average ability to differentiate essential from unessential details in his environment and is well aware of his surroundings. He distinguished himself on a test of analytic and synthetic ability. He was excellent in differentiating patterns into parts and reproducing them. This test (block design) is also said to measure spatial analysis or visual organization (11).

His exceptional performance on the block design test may be indicative of special talent in this area and might well be used for vocational guidance purposes.

A number of deviant verbalizations, completely irrelevant answers to questions and incoherent associations indicated the presence of psychotic disorganization of thinking.

Porteus maze test (5/5/52).

T.A.	14.0
T.Q.	106
Q score	15

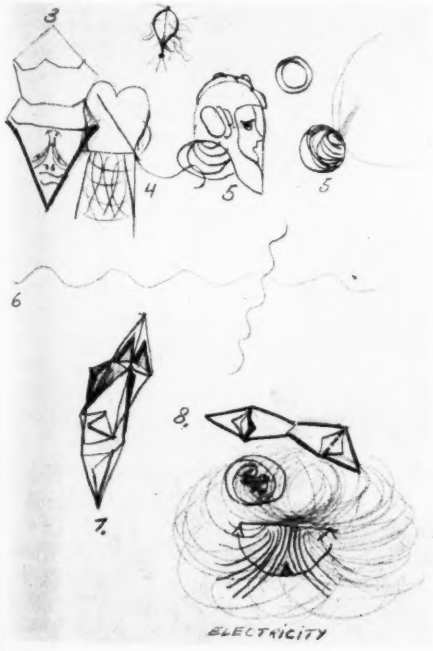


This test was administered at a time when Eric did not exhibit any disturbed behavioral manifestations. He had been attending school at the hospital and participating in various hospital activities at this time.

During the examination it was noted that Eric would look the maze over quickly and begin working instantly. He went right through the maze, giving little apparent thought to the outcome. The Porteus maze test indicates that Eric has adequate planning ability and his social maturity tends to be consistent with his age. The Q score is not indicative of any anti-social tendencies.

Bender-Gestalt (1/16/52). During the height of his manic episode Eric was visited and examined by the writers while he was being cared for in a seclusion room. During the administration of the Bender-Gestalt test we recorded some of his statements verbatim to give some indication of his thought content. When presented with card #1 he remarked: "You have to have double vision to see that. This is cobblestones, that's a leaf. You get a lot of money for making optical illusions on glass." Card #2: "It spells Z-H-Z-S-Y-X-Y, a little dot there means drip, drip, drip, that's the sign language of the Indians." Card #3: "That's an arrow—order of the arrow—that's what it means. This is Japanese. I think I have discovered something that hasn't been discovered before." "What's that?" "The abdomen—an organ." Card #4: "You know what you can use that for?" "What?" "To stretch your pants." Card #5: "What are you making?" "The atom man. It's circles that's all it is. That's where man gets his strength." Card #6: No information. Card #7: "What does that mean?" "Angelo—geographic. I am the only ancestor still living of the Angelo Egyptian. People laugh at me and call me crazy, but some day they'll be sorry." "Why will they be sorry?" "I will discover something they want and I won't give it to them. Michael Angelo is my ancestor." Card #8: "Thats an optical illusion—an Indian design." Patient then pointed to an area where there was a reiteration of circular lines and stated, "That's electricity in there. You know how electricity gets its strength?" "How?" "From the wind. Faith is the background of electricity." Patient then stated that he was born to have destruction in his soul.

It was interesting to note that when we gave Eric some candy he held it at arm's length into



the sunlight and looked at it as if he was inspecting a gem, and said, "That's German candy." "No, Eric, that candy was made in America." "No, it's German candy, it's so pretty. I have got German blood in me, that's where I get my strength."

Erics gestalt drawings tend to substantiate Bender's findings (5, p. 110) that "In each figure we are able to recognize the original configuration, but it is quickly embellished with a variety of ornamentation. Unlike the schizophrenic individuals who make additions to the configuration these do not destroy or distort the original figure but tend to embellish it or

emphasize it with additions which are secondary to the original design."

Eric's creative ability and originality are well illustrated in his elaboration of the designs.

Machover human figure drawings. The drawings illustrate graphically the oncoming process of personality disorganization which finds its climax in the fluidity and utter chaos of the third drawing. The first drawing (fig. 3), which was done three days after Eric's admission, reveals marked anxiety and insecurity; interpreted symbolically, it indicates his dependence upon, and anxiety in his relationship to an adult male figure. Since the man is carrying a tray of food it would seem that Eric seeks nourishment or symbolically love and affection from the object in relation to whom he experiences anxiety.

Drawing number two (fig. 4) was done while Eric was in seclusion. According to Machover (17, p. 74) "Clear anatomical indications of internal organs of the body are rarely encountered except in the drawings of schizophrenic or actively manic patients." Eric drew the brain, arteries, skeletal structure and vertebrae, etc. Figure 5 was done the following day, while Eric was still in seclusion and at the peak of his psychotic spisode. The ego boundaries have been virtually eliminated and the drawing conveys the feeling of primitive power and grandiosity. These may be considered manifestations of personality regression. Figure 6 was done three months later and shows more adequate ego organization and control; however, basic anxiety persists.

Rorschach[2] *(4/23/52).* The Rorschach was administered at a time when Eric showed no clinical manifestations of any disturbance.

[2] Scored by Piotrowski's system.

Eric's Rorschach protocol reveals that he is well adapted to the demands of reality. His percentage of clearly visualized forms falls well within the postulated limits of normality. He has, however, tendencies to stereotyped associative patterns. His intellectual preoccupations do not differ significantly from those of other people. His thinking is quite conventional. Although, generally speaking; he distributes his attention or intellectual energy optimally between abstract and theoretical matters and practical details, he is also never too accurate. He ignores the little details, but is sometimes carried away by his elated mood, and overgeneralizes without sufficient evidence or jumps at conclusions not warranted by the facts. The confabulated whole response which he gives to card 7 would offer a first suggestion of an infirm mentality. Motivated by wishful thinking, subjective and arbitrary perceptual organizations of his environment are likely to occur.

In the emotional sphere, we find a second clue to a serious maladjustment. Eric is decidedly undersocialized; he lacks rational control over his emotions and gives in readily to them. He is self-centered, infantile, and subject to mood swings. In Rorschach's own words (22, p. 33), he has "tendencies to impulsive emotional discharges." In the absence of any shading responses, considered to represent inhibitions, on the Rorschach, these personality characteristics are likely to be expressed in his overt behavior. He has no automatic defenses with which to curb his impulsivity. His motility is restless and labile. His initial reaction times to stimuli are relatively long. This may mean that he is consciously delaying his responses to stimuli in order not to blow up. Other defenses which he utilizes against the emergence of his primitive impulses into consciousness and the concomitant anxiety are partial repression, regression, and some capacity for the thoughtful delay of impulses. Yet, these defense mechanisms are inadequate to alleviate his intense anxiety. Control is definitely decreased. The blood response which he integrates in the context of "two people fighting," the color shock on plate 2 and his uneven initial reaction times indicate that this boy is very anxious and emotionally insecure. Although he is socially out-going and people stimulate him to greater productivity, his response to plate 2 shows a strong desire to escape close emotional contacts, presumably because of bad experiences in the past. He has a fear of being hurt in interpersonal relationships. Perhaps this is why he is now moving in the direction of greater introversion.

An analysis of his imaginative responses reveals that his conception of role in life is an active, self-assertive one. He wants to impress others with his worth and his importance. He has, however, difficulties in being self-assertive but the wish to maintain self-assertion in spite of obstacles. In anxiety-producing situations he will fight to gain his end. At such times he is capable of aggressive impulsive acts. The boy's sexual role is not yet too well integrated, but that is not unusual in a child of 13 or 14. A third and final suggestion of the presence of a pathological condition is the poor form response expressed in animal movement on plate 10. This is evidence of sporadic occurrences of autistic fantasy or creativity.

Symonds picture story test (12/7/51). During the administration of this test Eric was cheerful and overactive. The Symonds picture story test reveals a severely emotionally disturbed boy. There is considerable anxiety and conflict concerning parent-child relationships and psycho-sexual development and adjustment. Eric is an extremely insecure boy who is starved for love, acceptance and understanding. He feels terribly unaccepted and is looking for someone who will be kind to him. He feels unaccepted by his parents and expresses considerable hate and wishes for retaliation. There are, however, ambivalent qualities present. He tends to resist authority and becomes offensive when authority is asserted. Considerable feelings of persecution are evident—people are trying to fill him up with evil—spying takes place, etc. It is probable that Eric has met with a number of traumatic sexual experiences which he considers evil, dirty, and wrong. There is considerable anxiety attached to this factor resulting in an intense guilt reaction. A clue to these was obtained by the examiners subsequently when Eric was discovered in a number of homosexual relationships with known homosexual patients on the ward. It

TABLE 2.—RORSCHACH PSYCHODIAGNOSTICS

Name: Eric
Born: 1-29-38
WISC Intelligence: 93

Date: 4-23-52
C.A.: 14
Clinical diagnosis: Manic-Depressive Psychosis

R = 16
T = 4′ 53″
T/R = 18″

Failures: 0

R (VIII−X)% 7/13 = 54%

Int RT
(I−X) = 15″
(VIII−X) = 10″
(I−VII) = 12″
(Col) = 15″
(Non Col) = 15

I = 2	27″	42″
II = 2	27″	40″
III = 1	17″	26″
IV = 1	23″	42″
V = 1	7″	21″
VI = 1	7″	26″
VII = 1	9″	18″
VIII = 2	9″	23″
IX = 1	14″	30″
X = 4	7″	25″

W:M = 5 ÷ 2
M: C = 2 ÷ 3
(Fm+m) : (Fc+c+C′) = 3 ÷ 0
M:FM = 2 ÷ 3
FC:CF:C = 1 ÷ 1 ÷ 1
C:Σc3 ÷ 0

F% 50
F+% 6/8 = 75%
F+ Ror. 8/11 = 73%

a% 62
h% 12
at% —
sex% —
P = 31%

W	5	M	2	a	10
W		Mc			
WS		MC		ad	
DW	1				
				h	2
		FM	3 (1 minus)		
D	8	FMC		hd	
DR	2				
DS				at	
		m		bl	1
d					
di		Fc′		sex	
de		c′			
ds				pl	2
		F		ntr	
S		F+	6		
		F−	2	map	
		Fc			
s		c		obj	1
				arch	
		FC	1		
31%	W	CF	1	abst	
50%	D			fire	
		C	1		
12%	DR	Cn		——	
%	S			——	
6%	DW			——	

App: W:D: (d) : (S:) : *DR*
Seq:

P 5
O 1

Conspicuous:
(1)
(2)
(3)

Rorschach Diagnosis

Rorschach Prognosis

Piotrowski

RORSCHACH PROTOCOL

	INQUIRY
CARD I. 27″—42″	
1. I don't know, it looks like a butterfly of some sort. *W F+ a P*	Q. Whole think; middle part; shape. The front end looks like antennas.
2. It could be a moth. *D F− a*	Q. Just the side looks like a moth. It's big. That's all. (Beck's D4)
CARD II. 27″—40″	
∧∨∧ 3. Two people fighting, I guess, and blood.	Q. Two heads there. They got hats on. Two legs. They're bleeding there.
4. ⎧*W M H P* ⎩D C blood	Q. (Blood) the red, because it's red.
	Q. (Fighting) two arms are hitting. (Blood Beck's D3)
CARD III. 17″—26″	
5. Two people carrying baskets. *W M H P*	Q. (Beck's D7 are baskets).
	Q. (Are they men or women?). They could be both, I don't know. (What do they look more like?) More like men. (Why?) Shape of the head. Their hands look like it reached down and pick them up.
CARD IV. 23″—42″	
∧∨ 6. Some kind of animal. *Dr F+ a*	Q. (Lower two thirds of Beck's D5).
	Q. It's a caterpillar there.
	Q. Just the legs and eyes up here.
CARD V. 7″—21″	
∧∨ 7. That looks like a butterfly. *W FM a P*	Q. Antennas there, long; two legs, wings, shapes of them. Looks like it's flying around. A lot of butterflies flying around in the summertime.
CARD VI. 7″—26″	
8 <Gun,—ray gun—something. *Dr F+ obj. o+*	Q. (Exact half of W cut vertically).
	Q. Handle, trigger, barrel, rays. Flash Gordon has a gun like that.
CARD VIII. 9″—23″	
9. Two rabbits. *DW F− a confabulation*	Q. (What makes them look like rabbits?) The long ears. . . . (After considerable further questioning). Faces, paws, body, legs, feet. Just the shape, they are back to.
CARD VIII. 9″—23″	
10. A lizzard climbing a tree.	Q. (D1 as lizzard, and D8 plus center portion of D2 as tree.)
11. ⎧*D FM a* ⎩*D F+ pl combination*	Q. Lizzard because of legs, tail, face, and how long they are.
	Q. (Tree?) It looks like branches, that's all. (Anything else make it look like a tree?) Stem there, that's all.
CARD IX. 14″—30″	
12. Some kind of a flower. *W CF pl*	Q. (In what way does it look like a flower?) The leaves, the orange blossoms. (What makes them look like leaves?) The shape. (Anything else?) Cause they're green. Orange blossoms because they're orange.
CARD X. 7″—25″	
13. Looks like two spiders. *D F+ a P*	Q. Some many legs on it. (D1)
14. Insects. *D F+ a*	Q. Antennas, legs and eyes. (D8 D12)
15. Frogs. *D FM− a*	Q. Body and legs. They look like they're jumping. (D7)
16. Worms. *D FC a*	Q. These green things. (D4) (Why do they look like worms?) Green and it looks like they are curled, and the eyes.

is indicated that proper sexual training has been lacking and that a pathological state remains in the realm of psycho-sexual functioning. There is considerable rejection of older women and persecution initiated by men. There does not appear to be any adequate identification with a parent figure. He rejects his

TABLE 3.—SYMOND'S PICTURE STORY TEST

Series A

I. 2′ 50″

Oh, he's waiting for a bus.

Q. What led up to that?
A. (Long pause) Maybe they're treating him bad.
Q. Who?
A. Family or something. He thinks they don't love him. He's running away.
Q. What happens?
A. Maybe they beat him up and hit him so he waits by the corner for somebody to take him, trying to get a ride.
Q. What happens?
A. He's —.
Q. How does he feel about his parents?
A. He thinks they don't love him.
Q. How does it end?
A. Sad story.
Q. How do you think the story ends?
A. He meets some kind people and they take care of him and adopt him.

II. 2′ 40″

Probably walking around the streets and going there for food. He knocks on the door and wants food. I can tell by his face that he's tired and been walking a long time. He's begging for food. He left his family, maybe his family left him starving. Maybe there was not enough money to take care of him so they left him to shift for himself.

Q. What happens?
A. Maybe they accept him in. Maybe a doctor takes him in and gives him medicine and feeds him the right kind of food. Maybe they give him some money. Maybe he turns him over to some people he knows. He's begging for food.

III. 5″—1′ 25″

She's reading some kind of a book, the Holy Bible. She may be crippled or something. Maybe on a bed. She thinks nobody loves her and looks at a book.

Q. Why does she feel that way?
A. Nobody treats her right. Everybody has fun but she is crippled and has to stay in bed.
Q. What happens?
A. She feels nobody cares for her. Nobody talks to her and she thinks they have no feeling for her.
Q. What's the outcome?
A. Maybe she gets healed some way.

IV. 5″—2′ 15″

Looks like a bad . . ., I mean the man's got an evil look. He's offering the poor kid some money. The poor boy doesn't know what he means. He doesn't know evil, but he will fill him up with evil. He will give him evil. Maybe he will take the money and the boy doesn't know what he means.

Q. What led up to their meeting?
A. The boy probably saw this man come along. The man said, "Want to join me? I got a good offer for you. Maybe I will be back." The boy likes him because he gives him money. The man goes to jail, but puts the blame on the boy.
Q. What was the man after?
A. He wanted a helper. When they went to court, he convicted the boy. The boy didn't know anything about it. The Judge sentenced him. Maybe the boy —— and didn't know it. You can see the whole thing happen. Maybe the boy gets saved out from the trouble. The lawyer finds out.

V. 5″—4′ 10″

She looks like she was in a desert land and she's got some books. She looks like she was half dead. Maybe somebody comes along on a camel. Turks, maybe. They see her lying there and they . . . , maybe a caravan comes along and they take her.

Q. What is she doing there?
A. Maybe she was a kid . . . , I don't know. Looks like she's got school books there. Weeds and grass.
Q. What could have happened that she's out there?
A. Maybe she was left there.
Q. Who left her there?
A. Somebody. Missionary, maybe. Someone with no mercy.
Q. Who could that be?
A. Satan. Maybe Satan brought her out in the desert. I don't know. She's got there somehow. She either flew there or I don't know, maybe some Turks or Arabians gave her books, left her there and rode away on their camels. Maybe a missionary came along in a caravan, had mercy on her, gave her good food and nursed her. He takes her in and maybe they go somewhere and come to a town and he leaves her there. Maybe to return her by airplane transport to some place. Maybe to a hospital.
Q. How does she feel about Satan?
A. Fear. She obeys him.

VI. 6″—3′ 10″

Looks like a shadow there. A little woman there. The light is shining down. Looks like ten minutes past two in the night; light.

Q. What led up to that?
A. Maybe she treats him rough. She doesn't like him, maybe it's the mother or something. He's walking towards the shadow.

Q. How does she feel about him?
A. She hates him, possibly. Not hates him but maybe dislikes him.
Q. Why?
A. Maybe he's a criminal.
Q. How does he feel?
A. Possibly he doesn't like her. Maybe she treats him rough and hates him or something. He is going towards her. Going to try and get revenge on his mother. Because she treats him bad and he's got the wrong feeling towards her. Maybe he goes to court. Bad man. He tries to get revenge. Too much of an evil man. Tries to get revenge on his mother. Selfdefense.
Q. What happens in the Court?
A. Maybe mother tells them to convict him. Probably goes to jail for a long time. Two or three years. She testifies against him; he was the one who hurt her.

VII. 2′ 20″

That's the mother. She doesn't have much money. Not enough. Maybe they live in a small part of town, all diseases and rats and moist air; yellow fever. The boy turned bad and his mother is trying to tell him not to do that. He has the evil eye. Mother tried to tell him not to do that.

Q. What is wrong with these boys?
A. They don't have no . . . , they don't have the right kind of parents. Nobody to look after them, so they become a sidestreet gang. They rob people, grocery stores, because they have to have food. He doesn't care about his mother. She loves him and wants him to behave himself but he doesn't listen to her. Finally the boy is taken in, taken in by a man who takes care of him, adopts him and all of them. He feeds them and they get to like him and they call him Father. The man helps them out like he would his son.

6″—30″

By the expression on his face he won't listen to his mother. She's pleading with him, but he won't pay any attention.

Q. What does she want him not to do?
A. Steal.

VIII. 3′ 15″

She's bad. She's got the look of the devil in her eyes. She's a good girl and she's bad and she's filling her up with evil and the Devil.

Q. In what way is she bad?
A. Too much money-love. Maybe she goes in a bar room and drinks with men and they give her money. I mean pickpocket. The Devil is right in her eye. She's got good eyes. She's giving her the Devil. She don't know.
Q. What might have happened?
A. They work as two in the team. She's the good and that's the bad. She's filling her with evil. She makes her mind. Maybe they send her to court and she pleads and she tries to get her in these things and everybody tells against the poor girl because they think the good girl got the bad one in trouble but it was the bad one all the time, so someone spoke out and said she hangs around the bar room, the bad one, maybe someone said, that so and so this and so and so that and pickpocket. They get enough evidence and blame it all on her. They send her to prison. All evil. You can tell by her rings in her ears that she is a devil. That's the good one, you can tell by her hair. She's a clean spirit and she's bad. Good can conquer evil any day.

IX. 5″—2′ 30″

She looks like she was suffering from a disease and she's sweeping the floor. She's a worker or she's helping out. She don't get the right kind of food. Maybe she's suffering maybe she's helping someone out by sweeping and earning money. Maybe her son's in jail and she wants to help him out, so she works so hard that she gets weary and tired.

Q. What is her son in jail for?
A. Evil, steal maybe. Gamble, poker. She's maybe the mother of the son that's in jail and knows he didnt' mean to do it. She wants to help him out. She loves her son. He don't care for her. Finally he sees that she's helping him out and so she works on and on, washes the filth and dirt. Finally they let him out. Her son's in jail and she wants to get him out. She's always pleading with the officers to give him stuff but they won't. They take him in to some doctor.

X. 4′ 00″

Looks like a hula-hula man, a Turk, trying to fill him full of evil, saying that so and so is in that crystal ball. Saying something that ain't true.

Q. Who are they?
A. Maybe brother and sister.
Q. How does he feel about his sister?
No answer, a long pause.
Q. How might he feel about his sister?
A. He doesn't like her. He's filling him with evil and says his sister's evil and he is good. Maybe he hates his sister for some reason. Trying to make out he's an Egyptian. Practicing voodoo on them. He's filling him with evil about his sister. Telling him that she steals money, that she's bad. Maybe he's like the other boy, wrong gang, wrong bunch of boys. He ends up in court because he gives the kids too much evil. He probably goes to jail because he gives the minds evil and takes the good out of them.

Series B.

I. 5″—5′ 00″

He feels tough. Wrong crowd. Thinks he can rule the earth. I am going out and find that man and get revenge on him.

Q. Who might that man be that he's going to get revenge on?

A. Will be the boss, the one that beat him up. Wrong crowd. He didn't conquer what he did, couldn't conquer that fear, fear of evil. No good, no faith.
Q. When did he get this fear?
A. As long as he's been mixing with the crowd. Maybe he's younger. He didn't have anyone, nothing to do, no fun, so he mixed in with those boys and thought he'd get a kick out of it. He found out it was rough. They beat him up, the butt of a gun on the back. (laughs). They all go to court, boom, boom! I sentence you all to jail, life term.
Q. What did they do to deserve a life term sentence?
A. Too much bad. They said, "Damn you!" They all say it was the boy and he calls them liar and then he testifies about the real boss. "I know who did it. It was him." He was innocent so he testifies about the boss.
Q. What was his part in it?
A. The boss said he was chicken all the time. He wouldn't dare go in a grocery store. He didn't have the nerve to take anything. Didn't kill anyone. So he got out of it. They gave him just a two-year term, the rest got a life term.

II. 10″—3′ 55

Maybe a mother. She maybe fell in love with some man and she (mother) hates him. Maybe a doctor or something. Looks like poor people, poor house.

Q. How does she feel about her mother?
A. Despised her mother and her mother despises her. The mother looks like she's got ——. She treats the daughter rough. Finally the mother tries to get her to separate from the man she loves and tries to break him or something. She knows he's a good man but she doesn't like him. She wants to give her daughter too much evil.
Q. Anybody else trying to give the daughter evil?
A. The Devil. The Devil hates.
Q. What do you mean by too much evil?
A. Bad. She's trying to fill her up with the no good ideas. I don't know, just filth, dirt.
Q. What happens? What is the daughter going to do?
A. She goes away, I guess, leaves mother. She's got too much evil in her too. Mother beat her up. She don't like her mother.
Q. What is the outcome?
A. She leaves her mother. She'll probably be a nurse or something.

III. 7″—3′ 20″

He's got his mouth puckered up. A gangster, you can tell by the nose, beat up too much. His eyes are slanted. He's filling him up with evil, he's giving him evil by telling him about stealing.

Q. What is the relationship between these two?
A. Two guys. He's following. He's like a gangster and takes things and showing him different ways of stealing and gangstering and knocking poor men down and taking their money. I don't know what, it is evil. Finally they go on trial and they testify. All the pepole say of the younger one that they know he is a gangster. He hates his mother because she tells on him. She loves him. He tries to fill him up with evil. He's trying to withstand it. He's telling him not to love him mother and to treat her rough. He doesn't believe in that and tries to stand him off. One of the men he tries to kill and take the money from testifies that it was him that did it and the other one didn't do it. So he gets out of it. Sick in the mind, no rest, always trying. Went to Court and goes to the gallow (evil one). This one is taken into a good home.

IV. 25″—3′ 20″

Lily in her hand. (laughs) Two sisters and a mother. Fresh.

Q. How does the mother feel about these sisters?
A. She probably hates her and likes this one. She tries to make out good.
Q. Hates the one on the left and likes the one on the right?
A. Yes, you can tell by her face.
Q. How do they feel about the mother?
A. She knows that the mother hates her and she knows that the mother likes her and so she tries to get her in more trouble. Good girl and bad girl. The mother probably treats the good girl bad. (pause) Mother thinks she's trying to fill her up with evil but she can't. Maybe a doctor comes by and takes the girl and adopts her, takes her to a home. The mother tries to tell the doctor to leave her alone. The doctor said, "No, you're evil and you don't give the right kind of motherly love." She starts crying, making believe. They go to court and she tries to testify against her. People know the doctor means right and they testify for him.

V. 36″—2′ 20″

(Laughs) She's telling her something bad. Trying to get her into a barroom.

Q. Who is she?
A. Son of a bitch.
Q. Who is the other woman?
A. That's a mother or something. That's the daughter maybe and mother.
Q. What's the mother saying?
A. Telling her not to go into the barroom because it is bad for the mind and bad for the lungs. The daughter is swearing and cursing.
Q. How does the mother feel about her daughter?
A. She pities her. She knows she drinks too much and does things that are evil She gets in with men and mixes in with the barroom filth.
Q. How does the daughter feel about the mother?
A. She hates the mother because she is in too much evil. The daughter goes to court. She probably goes to woman's prison.

VI. 9″—2′

Sitting in a chair. Nobody likes him, nobody loves him. Family is gone, so he says he might as well be a gangster.

Q. What happens?
A. He thinks they don't like him and they know he is a gangster. Maybe someone takes him.
Q. What happens?
A. Cops come and pick up the gang. Picks the gang up and takes him to court. He says, "Nobody likes me, nobody cares for me." Maybe the parents are dead. His mother died from ——and his father got shot, may be by some criminal.
Q. How does he feel about his parents?
A. They dont' like him either.

VII. 7″—3′

The man's up and waiting for her. She's fearing the man.

Q. Does she know the man rather well?
A. Too well. She fears him. Doesn't know who he is.
Q. Did she ever see him?
A. She never sees him, just a dark shadow.
Q. What happens?
A. He's got his arms folded just like a – —. She's full of fear and he knows she fears him. She goes up street and she's carrying something.
Q. What finally happens?
A. He makes a mistake and he drops somthing, will be part of his —— and she finds it. She gets caught one night and she hollers help and the police hides behind the door. He's trying to fill her up with evil and make her do bad things. What men try to do. Have no mercy.
Q. What do they do that's so unmerciful?
A. Hatchet. She's got too much evil. Probably meets up with some missionary or a doctor, maybe the cop adopts her.

VIII. 35″—2′

She's trying to plead with him. They're mother and son. Telling him not to mix in with the other man. Telling her, 'Oh, shut up", and this and that. He hates his mother. He's got Satan all through him and doen't know what love is. She knows he is in the wrong. He says there's more money and all that. Crime doesn't pay and so the cops take him. Goes to jail.

Q. Did he get a square break?
A. No, he hated his mother.

IX. 4″—4′

He's —— up. Can't take it. No God, no faith. Too much evil. Behind bars. Maybe a preacher comes along and tells him good things. He learns about faith in God. He is in there for bad things. Maybe he slayed a man or robbed a store. Maybe some night watchman or something. A good minister tells him about God and he's interested because there is nothing else for him and he listens to the minister and learns the Holy work, and the Holy Book, the Lord, the Father, Son and the Holy Ghost. He learns those three. Lord's Prayer.

Q. Do you like the Lord's Prayer?
A. Yes. He finally faces the gallows, or electric chair. So the preacher goes with him and tells him, "Just say the Lord's Prayer as you face death. Take my soul to Heaven. Bless me, my father in Heaven and take my soul to Heaven." Put the iron cap on him, braces on his arms, shoulder, two braces across his legs. They send electricity as the man is saying the Lord's Prayer. God blesses him and has mercy on him and takes his soul to Heaven.
Q. Where did you learn all those things about the electric chair?
A. Comic books, they're dirty.

X. 5″—3′ 55″

Just coming from school and he's following her. Looks like her father. He wants to see where she goes and maybe he thinks she's in love with a man and he despises that man. He hates to see her learn things because he was brought up with work. She is scared of him and fears him. It looks like she's got tears in her eyes. Father wants to see where she goes. Maybe the one she loves is crippled.

Q. What does she like about him?
A. He's good to her, and father aint'. He is in a wheel chair.
Q. What kind of man is the father?
A. Evil, devil, Satan.
Q. What kind of a person?
A. He's evil and trying to get her to be evil too. Trying to get her to stop learning things about the world.
Q. Instead, what does he teach her?
A. Hate.
Q. What else does he teach her?
A. Fear.
Q. What happens there?
A. The cops put the man in jail. He tries to get revenge and kill her. She hollers for help. Maybe a man happens to be walking by and takes the father by the arm. Father goes to court. They put him in jail for a while. She gets married to the crippled man. She becomes a nurse, maybe, and helps other people.

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brother, and feels that the brother is favored by the parents. There is some confusion concerning his sexual role. Throughout most of the themes there is a constant element of punishment present. This tends to reduce his own feelings of guilt. Once he is punished he need no longer feel guilty for his acts. The individual commits an anti-social act as a result of influences exerted by those about him and he must pay for his crime. His theme

in these instances tends to be that crime does not pay; good conquers over evil. Along with this theme of punnishment there is an element of revenge, that is, a desire to get back at a parental figure.

Discussion

Our study of Eric has dealt mainly with interpretations of psychological tests. On the basis of these tests it is difficult to discern any one etiological factor. There are some workers in the field who claim hereditary and constitutional factors to be basic. Brown (9) states that "the expectancy of manic-depressive psychosis in children of manic-depressives is some twenty times as great as it is in the children of non manic-depressive patients." Kallman (13) in a recent publication further states that "the chance of developing either psychosis (schizophrenia or manic-depressive psychosis) increases strictly in proportion to the degree of blood relationship to the respective type of index case." Stürup, as reported by Bellak (4), stresses the pyknic constitution of a 13-year-old manic-depressive boy. Kasanin (15) also feels that "the constitution of the child seems to be the most important single factor in the etiology of the breakdowns." There are also those (Beres & Alpert, Sherman) who associate manic-depressive psychosis in children with organic infections. At the other extreme, Bellak (4) reports that in so far as the general problem of children of psychotic parents is concerned "Bender does not believe that there is any evidence for heredity in these children, except mental defectiveness. The environment seems to be an important precipitating factor." Brown (9) stresses identification. "Since we know that many of the psychological characteristics of the parents are taken over by identification, it is natural that some manic-depressive psychosis will develop on an apparently hereditary basis when the true cause is psychological." Bellak (1952) himself follows what he calls a "multiple-factor psychosomatic theory of manic-depressive psychosis." He first formulated it in his approach to Dementia Praecox which he states is "a syndrome caused by many etiologic factors ranging from primarily psychogenic to primarily organic ones, but always being a result of both."

We have reported that Eric's father was 15 at the time of his first admission. We are unable to say to what extent Eric's mental illness is basically inherited or one of identification. He is the son of an unquestionably manic father who is both his progenitor and the object of his identification. During Eric's formative years the father was frequently absent from the home because of his own manic episodes which required institutionalization. This would certainly have a vital influence on Eric's emotional development. Finally, we are able to substantiate the clinical syndrome described by Kasanin (15) who states that "the clinical picture of a manic disorder in children consists of a mild elation, overactivity, irritability, and a push of speech."

Summary

A review of the literature shows that manic-depressive psychosis in children below the age of 15 is statistically rare. We have presented a brief case record of a 13-year-old manic-depressive boy's psychologic test responses and a description of his behavior during the testing sessions. It is to be especially noted that the tests were administered over a period of 6 months in the latter half of his thirteenth year. During this time Eric's behavior fluctuated considerably.

According to our results, Eric's principal personality characteristics, as revealed by psychological tests are: 1) disorganization of thinking and flight of ideas, particularly during his excited state; 2) marked anxiety and emotional insecurity; 3) a dependence and a need to be loved and accepted; 4) deep concern and ambivalence about his relationship to his parents; 5) lack of emotional control, or impulsivity; 6) preoccupation with the body and aspects of strength; 7) an active self-assertive self concept, resistance to authority, and retaliation against it; 8) feelings of guilt, probably produced by sexual experiences.

The following information was received from the patient's father in March 1954, two years after the patient's initial psychotic episode: "Eric gets along exceptionally well, in fact, better than he has ever been in the past three years. Not a thing which suggests that he is not well; entertains nothing whatsoever in peculiar ideas. He does errands very willingly. Yes, he is recovered. Request him discharged."

The patient was discharged from trial visit as of March 13, 1954 and has not been heard from since.

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DEPT. OF PSYCHOLOGY.
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ELECTROCONVULSIVE THERAPY, GASTRIC SECRETION AND HISTAMINE

A Preliminary Study of Possible Interrelationships [1]

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INTRODUCTION

In previous reports (20, 21), it was noted that the therapeutic use of histamine in psychotics not only was of definitive benefit, but also that the results were at least comparable to those attained with electroconvulsive therapy (ECT). The use of histamine as a biochemotherapeutic agent in psychiatric disorders was suggested by three experimental findings which suggested the possibility that a histamine-like substance had a role in the special physiology of psychotic patients and the effects of ECT upon them. These three phenomena were: 1) an extraordinarily high incidence of fasting hypochlorhydria and achlorhydria in psychotics; 2) an increase in the acidity of the gastric juice following ECT; 3) the occurrence of a delayed and phasic hyperemia in the contralateral ear of a rabbit, following a more immediate hyperemia of the ipsilateral ear to which an electric current of the same voltage and duration as ECT was applied. The study of the first of the above, namely, fasting gastric acidity in female psychotics, has already been reported (22). The present paper embodies studies on the effect of ECT on fasting gastric acidity in psychotics and the possible role of a histamine-like substance, which for present purposes, we shall refer to as "histamine."

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[2] Deceased.

Variations from physiologic norms have been repeatedly sought in the psychotic both before and after therapy, especially ECT and insulin coma. The high incidence of anacidity and hypoacidity in psychotics, recently reported in connection with the present series of studies (22), has been the subject of sporadic papers since 1890 (7, 11, 17, 19).

Changes following ECT. Such effects of ECT as oversecretion of mucus in the respiratory tract (14), excessive salivation (24) and increase in blood glucose (12, 16) have been noted without explanations of the mechanisms involved. Spectroscopic examinations of the cerebrospinal fluid following ECT revealed the presence of a new substance (23) which was later identified as a breakdown product of nuclear material. Increase in gastric secretion during ECT was reported by Fetter (8) who attributed it to vagal stimulation.

Changes following insulin therapy. The effect of insulin coma therapy on gastric secretion has also been reported and is similar to that observed with electric shock during this study. Beiglbock and Dussik found marked hypersecretion and hyperacidity of the gastric juice following hypoglycemic shock. Their observations, together with a similar finding by Bruhl and Katzenelbogen (15), led them to include this secretory response as one of the biochemical and metabolic changes following insulin coma therapy.

Billig and Hesser (2), using Code's technic of histamine bio-assay, found an increase in blood histamine in insulin shock therapy with maximal concentration during the period of deepest shock. "If shock is interrupted by the intravenous administration of dextrose, however, release of histamine returns to normal; the inactivating capacity of tissues is restored, and the histamine concentration of the blood falls to the pre-shock level as recovery

takes place." The increase in gastric secretion referred to above may, at least in part, be due to such increase in circulating histamine.

More conclusively to implicate histamine as a chemical mediator of ECT, i.e., as a therapeutic agent brought into play by this therapy, precise determinations of histamine blood level would seem desirable before, during and after ECT. Present-day methods, however, are at best approximate, and depend on bio-assay. It was our purpose to study physiologic effects, during ECT, parallelling those produced by administration of histamine, as a clue to histamine release. To the extent that a given effect is not otherwise mediated, the subject himself may be utilized as the bio-assay animal for histamine-like substances released during treatment. One such effect is gastric secretion. We, therefore, observed the effect of ECT on gastric secretion.

Clinical Material

Seven patients were selected for this study. The age, diagnosis and length of hospital stay of each appear in table 1. The patients ranged in age from 27 to 48; hospitalization from 4 months to 10 years. There were three manic-depressives, manic (A, D and E), two catatonic schizophrenics (B and C) and 1 each of paranoid (F) and hebephrenic (G) schizophrenics. Three of the patients, A, C and E, had previously had ECT with resultant transient improvement. They afforded an opportunity for analysis of gastric secretion not only during and after ECT but also possibly during periods of improvement and relapse.

TABLE 1.—Age, Diagnosis and Present Hospital Stay

Patient	*Age*	*Diagnosis*	*Hospital Stay to Nearest Year*
A*	39	M. D. Manic	9 years
B	30	D. P. Catatonic	4 months
C*	31	D. P. Catatonic	10 years
D	48	M. D. Manic	2 years
E*	35	M. D. Manic	2 years
F	32	D. P. Paranoid	4 months
G	27	D. P. Hebephrenic	11 months

* These patients had been on ECT several months earlier. They had shown improvement, then relapsed to previous status.

Procedure

Before electroconvulsive therapy

An initial fasting specimen and two additional aspirations at half-hour intervals were taken for two days prior to the institution of ECT.

During the course of therapy

The patient was given a course of 13 to 15 shock treatments of the standard voltage and duration, sufficient to produce a grand mal convulsion. On each day of treatment the following gastric specimens were collected: 1) fasting specimen prior to shock; 2) within 15 minutes after shock; 3) one-half hour after shock; 4) one hour after shock; 5) one and one-half hours after shock.

Following completion of course of electroconvulsive therapy

In a one and one-half hour period before breakfast, three fasting specimens were aspirated daily until the patient had recovered or relapsed. The first specimen collected was again referred to as the initial fasting specimen.

Experimental Data

All the values are expressed as degrees of free acid according to the clinicopathologic convention in which the values in cubic centimeters of N/10 NaOH necessary to neutralize the acid to the end point of a canary yellow, using Töpfers reagent, is multiplied by 100. In this series of studies, only free acid values are included since preliminary analysis of gastric specimens of all patients on the two days immediately prior to the institution of ECT revealed the total acidity to be parallel to free acidity. This is, perhaps, to be expected as in the fasting stomach free from organic lesions there is but a minimum of substances which would disturb this parallellism.

Before electroconvulsive therapy

The fasting free HCl levels obtained on two successive days are listed in table 2. A study of the table shows that:

1) Initial fasting specimen revealed hypoacidity in 6 of the 7 patients on both days. The seventh (G) showed anacidity on the second day.

TABLE 2.—FASTING GASTRIC FREE HYDROCHLORIC ACID (IN DEGREES) FOR TWO DAYS PRIOR TO ECT

	1st Day				*2nd Day*				
Specimen	*1*	*2*	*3*	*Mean*	*1*	*2*	*3*	*4*	*Mean*
Patient A	3	20	10	11	14	0	10	8.5	8.13
Patient B	0	35.5	0	11	0	14.5	29	0	10.88
Patient C	0	5.5	1.5	2.3	0	15	0	0	3.75
Patient D	0	0	0	0	0	0	19	7	6.5
Patient E	0	0	0	0	0	0	0	2.5	.62
Patient F	13.5	25	15	17.8	4	0	0	3	1.75
Patient G	34	19	11	21.3	0	0	0	0	0

2) The initial fasting specimen revealed complete apparent anacidity in 4 (B, C, D and E) of the 7 patients on both days.

3) In at least one of the specimens obtained, all 7 patients showed no free HCl. Four patients (C, D, E annd G) had apparent anacidity in three or more specimens.

4) Apparent anacidity or hypo-acidity in *all* specimens obtained on either of the two days was found in three (D, E and G) of the 7 patients.

5) The mean values for fasting free HCl on the two days for each of the patients revealed 12 determinations below average of normal patients and only two within commonly accepted normal limits (including a mean value of 17.8° as one).

During the course of electroconvulsive therapy

The highest and lowest pre-shock fasting HCl level and the immediate postshock peak level of all the fasting specimens are listed in table 3. They are compared with highest and lowest levels attained in seven aspirations on the two days immediately prior to the start of therapy and to similar levels following completion of course. Charts 1 and 2 portray the effect of ECT on gastric secretion. They record the mean of all 7 patients before shock (initial fasting level) and for 1½ hours immediately after shock (4 gastric aspirations) over a period of 12 ECT days. Study of these data reveals:

1. ECT generally produced an immediate elevation in free gastric HCl.

2. This increase usually lasted up to 1½ hours, by which time gastric analysis revealed a declining level.

3. The increased acidity could not be demonstrated as carried beyond the treatment period. Initial fasting levels on subsequent days revealed rhythmic increases and decreases forming the wave effect in charts 1 and 2.

4. Postconvulsion and peak level determinations when plotted (see charts 1 and 2) roughly paralleled the same rhythmic wave pattern as the initial fasting level.

5. The mean initial fasting level showed an increase from 4.89° before ECT to 7.96° during ECT.

Following course of ECT

The highest initial fasting HCl level and peak level of all the fasting specimens during this period are given in table 3. The daily mean fasting free HCl levels before, during and after a course of ECT are recorded in the same table. Chart 3 plots the mean initial fasting gastric HCl before, during and after a course of ECT and compares these findings with those reported in the literature for normals and the mean level for psychotics previously reported by the authors (22). Chart 4 plots the mean gastric acidity of *all* aspirations (initial pre-convulsion and 4 postconvulsion readings during ECT course).

1. Though the mean of all specimens was higher during the course of therapy, the initial fasting level showed an increase from a mean of 7.96° to 8.9° with less deviation from the mean.

2. The mean initial fasting gastric HCl after a course of therapy, 8.9°, would seem to be markedly higher than the pre-treatment average of 4.89°. However, the possibility exists that the latter figure, calculated from readings over two days, is misleading. These aspirations

TABLE 3.—MEAN AND RANGE OF FASTING GASTRIC FREE HCl BEFORE, DURING AND AFTER COURSE OF ECT

Patient	Before ECT		During Course of ECT*												Range and Mean 12 Days	After course of ECT						Range and Mean 19 Days	
	1	2	1	2	3	4	5	6	7	8	9	10	11	12		3	6	9	12	15	18		
	20.0	14.0			44.5			41.5			37.0			56.5	88.5	27.5	60.0	18.0	29.5	47.5	10.0	60.0	High
A	11.0	8.13	18.7†	53.1	33.1	48.0	31.9	21.2	17.1	26.2	29.8†	34.6	25.6	39.4	31.6	15.5	32.3	6.0	24.2	43.5	3.3	20.7	Mean
	3.0	0.0			9.0			0.0			25.0			0.0	0.0	0.0	14.5	0.0	19.0	38.5	0.0	0.0	Low
	35.5	29.0			3.5			10.0			19.0			39.5	39.5	9.0	16.5	30.0	18.5	22.0	0.0	40.0	High
B	11.0	10.9	20.4	1.9	0.7	6.5	9.7	4.6	7.2	0.0	8.0	15.3	15.6	13.1	8.6	6.2	9.9	17.5	6.2	12.2	0.0	9.7	Mean
	0.0	0.0			0.0			3.0			0.0			0.0	0.0	4.5	0.0	6.0	0.0	0.0	0.0	0.0	Low
	5.5	15.0			61.5			31.5			27.0			39.0	71.5	0.0	24.0	10.5	21.5	56.5	30.5	51.0	High
C	2.3	3.8	47.6	49.0	41.3	25.0	27.8	18.0†	16.0	12.7	19.6	27.8	15.4	23.5	27.0	0.0	19.8	9.0	19.2	32.5	17.7	16.7	Mean
	0.0	0.0			13.5			0.0			9.0			0.0	0.0	0.0	13.0	6.5	16.5	17.0	0.0	0.0	Low
	0.0	19.0			45.0			55.0			46.0			40.5	55.5	4.5	27.5	0.0	0.0	0.0	0.0	32.5	High
D	0.0	6.5	2.3	7.4	25.1	28.5	15.9	23.5	16.4	22.1	23.3	12.6	14.2	12.0	16.9	1.5	14.8	0.0	0.0	0.0	0.0	2.1	Mean
	0.0	0.0			5.0			0.0			0.0			0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	Low
	0.0	2.5			4.0			15.0			28.5			44.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	32.5	High
E	0.0	0.6	0.0	1.1	0.8	1.5	0.0	6.5	5.7	19.4	13.8	7.5	18.9	17.1	7.7	0.0	0.0	0.0	0.0	0.0	0.0	1.7	Mean
	0.0	0.0			0.0			0.0			0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Low
	25.0	4.0			35.0			14.0			5.5			0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	High
F	17.8	1.8	22.6	10.0	22.3	0.6	2.3	2.8	5.5†	2.4	1.8	0.9	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Mean
	13.5	0.0			10.0			0.0			0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Low
	34.0	0.0			70.0			57.5			45.0			38.0	70.0	16.5	50.0	19.5	14.5	27.5	41.5	50.0	High
G	21.3	0.0	5.4	11.6	40.0	32.3	28.1	26.8	11.1	25.5†	25.7	19.2	39.3	30.1	24.6	14.7	29.5	11.5	4.8	10.7	38.0	17.3	Mean
	11.0	0.0			6.0			0.0			8.5			23.0	0.0	12.0	19.0	0.0	0.0	0.0	35.5	0.0	Low

* Mean value obtained from 5 specimens except on first shock day when preshock reading was excluded. Mean of 3 and final 4 specimens of that day. Specimens were collected 15 minutes and 30 minutes after convulsion and then at 30 minute intervals.

† Fourth specimen not obtained; mean calculated on 3 specimens only.

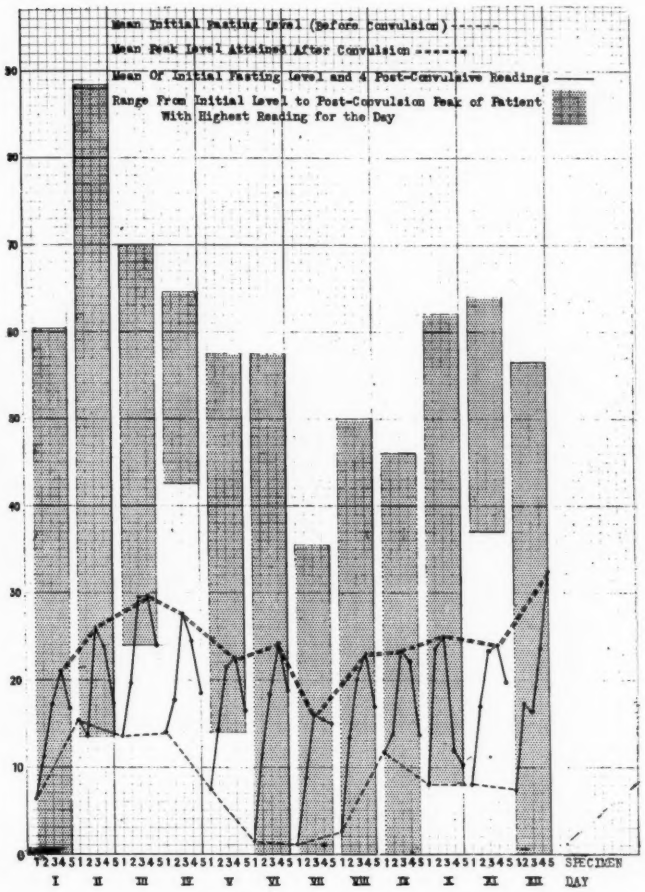
Mean Initial Fasting Level (Before Convulsion)
Mean Peak Level Attained After Convulsion
Mean Of Initial Fasting Level and 4 Post-Convulsive Readings
Range From Initial Level to Post-Convulsion Peak of Patient With Highest Reading for the Day
SPECIMEN
DAY

CHART 1. Mean gastric fasting free HCl levels of 7 patients during 12 days of ECT.

may well have been done at time of the trough in the wave-like secretion of gastric HCl revealed in this study—if such phasic activity indeed occurs before ECT is instituted.

3. The mean initial level of 8.9° after the course of ECT corresponded remarkably with the previously reported mean of 8.7° in hospitalized psychotics—many of whom had had such treatment at some time in their hospital stay.

4. In all but one patient (F) the highest gastric HCl level, attained in 18 days after the course of ECT was completed, was markedly increased over the previous high recorded before institution of therapy. Again, the possibility of trough (low) readings should be considered, as above, as exaggerating somewhat the differences found.

DISCUSSION

Our finding of a high incidence of fasting apparent achlorhydria and hypochlorhydria in psychotic patients has been reported previously, with a review of the literature (22). This gastric dysfunction has been attributed by some to an inadequate parasympathetic activity. Conversely, it has been stated that "electrotherapy induced changes which indicate vagus activity" (8). This would necessarily implicate acetylcholine as the ultimate media-

Specimens were collected 1? minutes after ... † Fourth specimen not obtained; mean calculated on 3 specimens only.

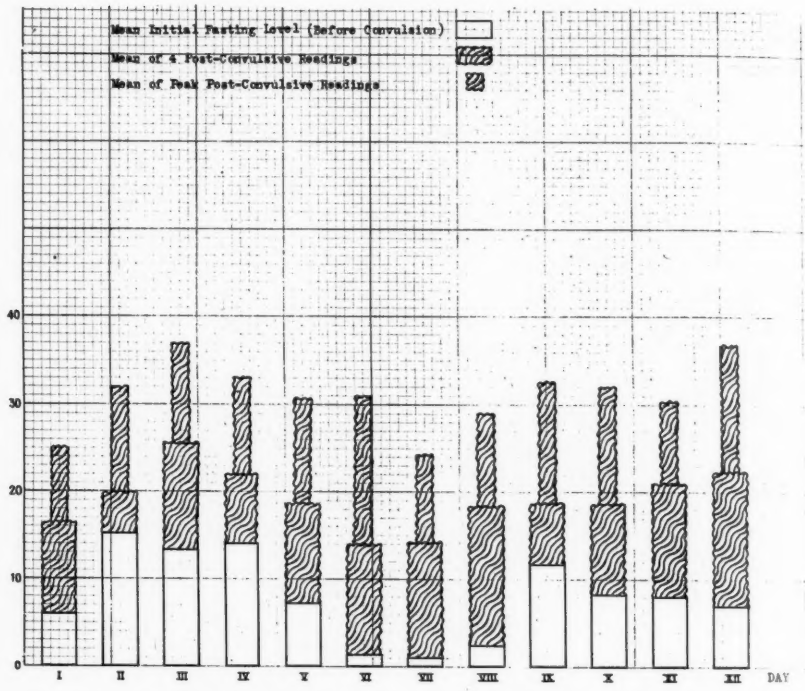

CHART 2. Mean gastric fasting free HCl levels of 7 patients during 12 days of ECT.

tor. However, a second hypothesis must be considered, which is neither contradictory to nor exclusive of the possibility of nervous-acetylcholine mediation. In the absence of conclusive experimental evidence to the contrary, the low gastric acidity found in psychotics could be attributed hypothetically to a relative absence or diminution which could result from either underproduction or excessive "neutralization" by some physiologic antagonist.

Histamine, or a histamine-like substance is found in the cells, particularly the nuclear portion. In the blood, 90 per cent is carried by the leukocytes (3). Best and his associates (1) demonstrated that histamine is present in the interior of living cells as long as the cell membrane is intact. Stimulation or injury of cells causes histamine to escape into the extracellular fluid. The frequent presence of a leukocytosis in patients undergoing ECT (16) provided conditions in which an increase in the circulating level of histamine could be brought about following the stimulation or "injury" due to that therapy.

In the spectrophotometric study of cerebrospinal fluid following electric shock, Speigel and Spiegel-Adolf (23) showed the presence of abnormal amounts of nucleic acids or their constituents which is suggestive of increased breakdown of nuclear substances. It is thus likely that this form of therapy not only may stimulate parasympathetic activity, but also may cause the release of histamine by the affected tissues.

Several investigators (4, 12, 13, 15, 16) have reported or reviewed many other biochemical, metabolic (cerebral and systemic) and physical changes following electric shock. Some of those changes could also have been produced by the administration of histamine; for example, increased gastric secretion and acidity (8, 20) oversecretion of saliva and excessive mucus in the respiratory passages (22), increased cerebrospinal fluid pressure

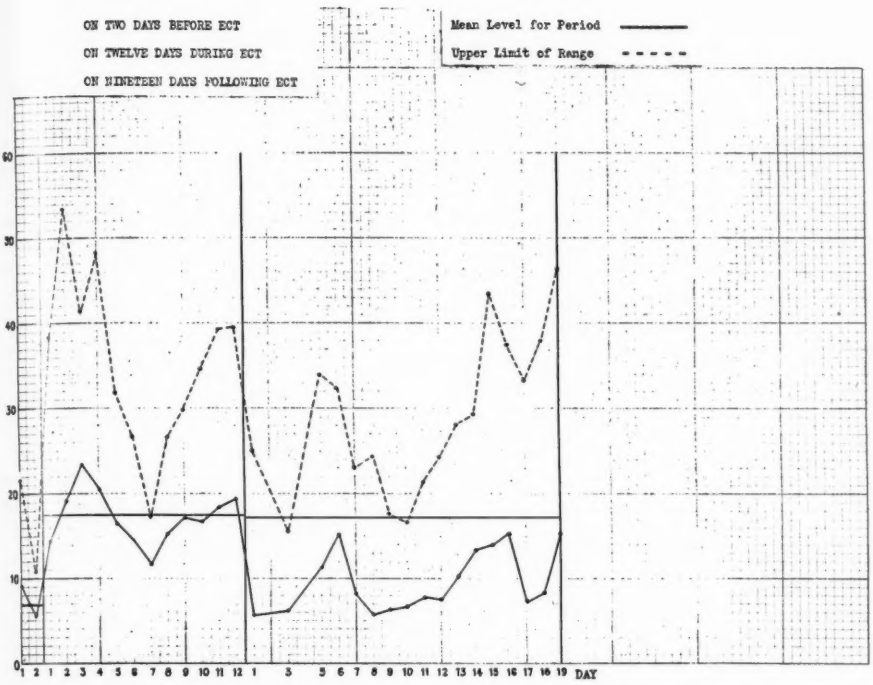
ON TWO DAYS BEFORE ECT
ON TWELVE DAYS DURING ECT
ON NINETEEN DAYS FOLLOWING ECT
Mean Level for Period
Upper Limit of Range
60
50
40
30
20
10
0
1 2 1 2 3 4 5 6 7 8 9 10 11 12 1 3 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 DAY

CHART 3. Mean initial gastric fasting free HCl levels of 7 patients; highest initial level each day; and comparison with mean levels—as reported in the literature for normal subjects and psychotic patients.

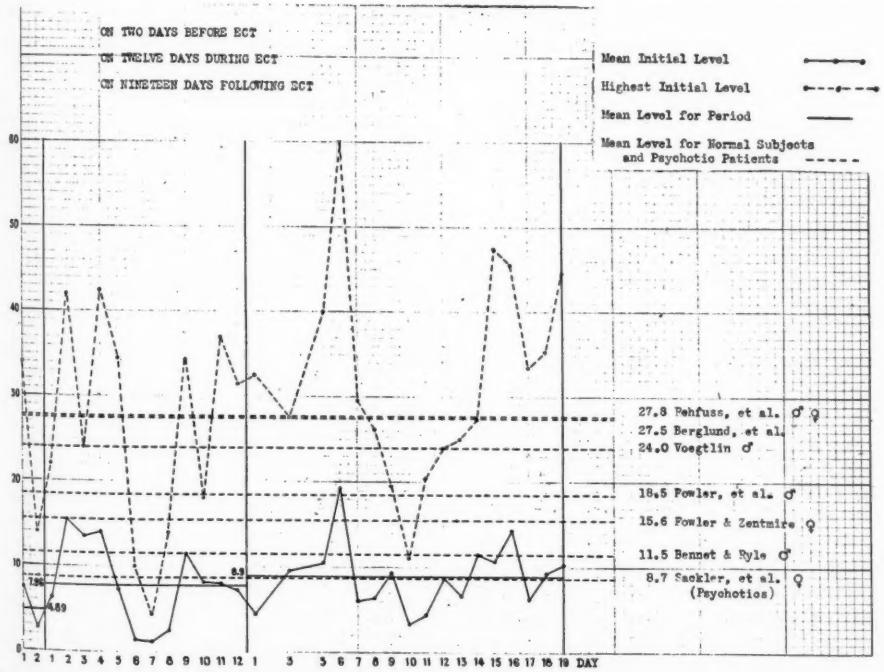
ON TWO DAYS BEFORE ECT
ON TWELVE DAYS DURING ECT
ON NINETEEN DAYS FOLLOWING ECT
Mean Initial Level
Highest Initial Level
Mean Level for Period
Mean Level for Normal Subjects and Psychotic Patients
27.3 Pehfuss, et al. ♂ ♀
27.5 Berglund, et al.
24.0 Voegtlin ♂
18.5 Fowler, et al. ♂
15.6 Fowler & Zentmire ♀
11.5 Bennet & Ryle ♂
8.7 Sackler, et al. ♀ (Psychotics)
8.9
7.8
4.89
60
50
40
30
20
10
0
1 2 1 2 3 4 5 6 7 8 9 10 11 12 1 3 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 DAY

CHART 4. Mean gastric fasting free HCl levels of 7 patients and highest reading for the day (calculated from initial level and 4 additional aspirations).

followed by a fall in pressure (13), and finally, increased oxygen saturation after electroconvulsion (15). These phenomena all occur after histamine administration (9, 10, 18, 20).

The mechanism of histamine action is still not clear. Gibbs and McClanahan (10) state that histamine may act "indirectly as a secretory agent of salivary secretion and also through a parasympathetic or cholinergic mechanism." In this view, the neuro-acetylcholine role and the part played by histamine in the secretory function of the stomach need not be mutually exclusive.

The more recent surgical procedures in which "total" vagotomy has been performed for the relief of gastric ulcer are contributing to our knowledge of the gastro-secretory mechanism of histamine. Dragstedt (6) states, "The operation has no effect on the secretory response of the stomach to histamine or caffeine, but it abolishes the stimulating effects of insulin hypoglycemia and a sham meal."

More recent reports, reviews and discussions (5) have supported Dragstedt's position that the histamine-stimulating effect on gastric secretion persists even after vagotomy and is thus independent of nervous mediation.

Histamine, if increased during and after electroshock, may exert a cerebral effect either directly (similar to the findings of Dragstedt in the stomach) or indirectly (similar to the findings of Gibbs and McClanahan (10) on salivary secretion).

If a histamine-like substance (or other cerebral vasodilator agents were even in part responsible for the beneficial effects of the shock therapies, it is possible: 1) That in some cases cerebral metabolism may have been disturbed either by cerebral vasoconstriction or by impaired cerebral oxygen exchange or through other mechanisms, any one of which could originally have contributed to the sequence of events ending in the presenting symptomatology; 2) That the sympathetic-adrenal system over-reacts or substances providing for the inactivation or removal of histamine are developed in excess during periods of stress eventuating in mental disturbance; 3) That following electroshock, one would find physiologic evidence of the release of histamine or an H substance such as gastric hypersecretion and hyperacidity.

It was this speculation on the role of histamine in the body economy of the psychotic which led us to its trial as a biochemotherapeutic agent in psychoses. The beneficial results so far reported could lend supportive evidence to the view that it does play a part; but, on the other hand, these could be due to other and still unknown effects of histamine. A simultaneous determination of the histamine content of the blood during ECT, the role of histamine in nerve-acetylcholine mediation of gastric secretion and the effect of the anticholinergic substance on the gastric secretion following ECT and following histamine are indicated in the experimental agenda of this field.

Summary

Analysis of the fasting gastric HCl in 7 female psychotic patients indicated a high incidence of apparent anacidity and hypoacidity. Electroconvulsive therapy demonstrated that this was not a constant and irreversible reduction since convulsive therapy was followed by an increase in gastric secretion and acidity. The increase following ECT was immediate and lasted for 1½ hours. The peak level was generally reached by this time, and was then followed by a return to a lower level of acidity. However, following the course of ECT, there was generally a higher free HCl content than before therapy. The likelihood of histamine release during ECT is pointed out, its role in therapy is raised and the evidence in favor of such a view is discussed.

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FASTING APPARENT ACHLORHYDRIA AND HYPOCHLORHYDRIA IN PSYCHOSES [1]

A Preliminary Report

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In consultation with J. H. W. VAN OPHUIJESEN, M.D.[2]

During a series of studies on female psychotic patients at Creedmoor State Hospital, a strikingly high incidence of fasting apparent achlorhydria was observed. (27, 28) This finding led to the present study of the fasting free hydrochloric acid level of 105 psychotic patients, all females.

CLINICAL MATERIAL

Selection of patients

A total of 105 patients was chosen at random, i.e., without regard to psychiatric diagnosis or length of hospitalization, from among patients below the age of 50.

Group A: 7 patients, all with "functional" psychoses, from whom 3 or 4 gastric specimens were taken at ½-hour intervals on 2 successive days.

Group B: 100 patients including both "functional" and organic psychoses. Through chance selection 2 patients previously observed in Group A were included.

Diagnosis

The diagnosis recorded for each patient was the last diagnosis made prior to institution of the survey. The hospital routine assured periodic mental examinations within specified time intervals and required confirmation of each diagnosis by the medical director or the medical staff. The breakdown into 10 diagnostic categories is given in table 1 for both groups studied.

There were 81 cases of dementia praecox, of which 42 were catatonic, 24 paranoid and 15 hebephrenic; 14 manic depressive, of which 9 were manic, 2 depressed and 3 mixed; 10 miscellaneous, of which 6 were mental defectives, 2 had meningovascular syphilis, 1 was a postencephalitic and 1 a psychopathic personality.

Age distribution

The greatest number of patients were between 26 and 40. No patient over the age of 50 was included in the study. The distribution by age for both groups is recorded in table 2.

TABLE 1.—CLASSIFICATION

	Group A	*Group B*	
Dementia praecox			
Catatonic	3*	41	
Paranoid	1	23	
Hebephrenic	—	15	79
Manic depressive			
Manic	2	7	
Depressed	1	1	
Mixed	—	3	11
Miscellaneous			
Mental deficiency	—	6	
Meningovascular lues	—	2	
Postencephalitis	—	1	
Psychopathic personality	—	1	10

* Two patients included in both groups were in this diagnostic category.

TABLE 2.—DISTRIBUTION BY AGE GROUP

Age Group	*Group A*	*Group B*
18-20	—	5
21-25	—	10
26-30	2	20
31-35	3	30
36-40	—	27
41-50	2	8

[1] The authors gratefully acknowledge the encouragement and assistance of Drs. H. A. LaBurt, Senior Director, Creedmoor State Hospital, and Co Tui, Associate Professor of Experimental Surgery, New York University College of Medicine. The work was carried out with the wholehearted participation of Nora McCarthy, R.N., Supervisor, R Building, and her staff. The expenses of this study were defrayed by a grant made in the memory of Isaac Sackler. Submitted July 1949.

[2] Deceased.

Hospital residence

The majority of patients fell into three categories as to length of stay, namely, 1-12 months, 1-2 years and 6-10 years. These data are charted in table 3.

Methods

Since achlorhydria, hypochlorhydria and hyperchlorhydria are associated with a large number of clinical conditions, the presence of such conditions must be either ruled out or taken into account. A major consideration is the tendency toward decreasing acidity with increasing age. Vanzant and Alvarez (32) attribute this to low acid secretion, while Polland and Bloomfield (22) implicate a diminished flow level. The exclusion of patients above the age of 50 would help to limit the age factor.

The occurrence of transitory states of achlorhydria and hypochlorhydria in the female during menstruation (32, 33, 34), pregnancy and toxemias of pregnancy (7) was avoided by examination at the proper time.

Finally, routine physical examination, exclusive of extensive laboratory procedures, helped rule out inclusion of other clinical conditions associated with achlorhydria. Among these are carcinoma, edema, gallbladder disease, chronic colitis and marked hypothyroidism (7); also, nicotinic acid and thiamine deficiency (29, 7, 36), A-avitaminosis (36), mild Graves' disease (22), pernicious anemia (7, 16) and Addison's disease (8). It is nonetheless appreciated that subclinical vitamin deficiencies may have been present in the patients observed and may have contributed to the low values found.

Since the therapeutic regimen of each patient was known, decreased gastric hydrochloric acid due to roentgen rays (24) sulfanilamide (9), epinephrine (7, 1) pituitrin (7), atropine (29, 7) high protein diet (13) and vagotomy (29) were ruled out.

TABLE 3.—Distribution by Length of Hospital Stay

Hospital Residence	*Group A*	*Group B*
1-12 months	3	21
13-24 months	2	20
2-3 years	—	6
3-5 years	—	14
6-10 years	2	25
11-15 years	—	9
Over 16 years	—	5

The occurrence of increased acidity in association with various factors was likewise evaluated as a possible source of error in the other direction. Hypocalcemia, alcohol, tobacco, morphine (after a transient inhibition), pilocarpine, nicotine, insulin and histamine have all been reported to induce gastric hypersecretion (29). Short periods of fasting (one to two days) (13), burns (19), hypnotic sleep (7), and electroconvulsive therapy (10, 27) are also stated to be associated with hyperacidity. None of the drugs mentioned was available to the patients. However, several of the patients had previously undergone electroconvulsive therapy. Inasmuch as this procedure had been carried out several weeks prior to the study, it was felt that any such effect if present would be negligible. If by chance a significant effect were present, it would not detract from the reported trend to achlorhydria but would emphasize it.

Procedure

The patients were brought to one ward before breakfast and a Levine tube was passed via nose or mouth, depending on the cooperation obtained. Gastric contents were aspired with the aid of a bulb syringe, sufficient juice being obtained to permit determination of acidity. In Group A, three or four specimens were taken at half-hour intervals on two successive days; in Group B, only one specimen of fasting gastric content. Analysis was carried out by direct titration with N/10 sodium hydroxide solution and the results expressed as clinical units or degrees of acidity.

The fasting gastric content was selected both for analysis and as a point of reference instead of the gastric contents after a test meal, because of variables introduced by dilution and buffering of gastric content by test meal procedures (25), and because the conditions surrounding work with active psychotics were complicated and required simple procedures. Moreover, we desired to evaluate the day-to-day status of fasting gastric function in the psychotic as compared with the normal rather than the height of potential function.

TABLE 4.—Fasting Free Gastric Hydrochloric Acid Levels in Group A*

	Specimen						
Pt.	*1*	*2*	*3*	*1*	*2*	*3*	*4*
A	3°	20°	10°	14°	0°	10°	5°
B	0°	35.5°	0°	0°	14.5°	29°	0°
C	0°	5.5°	1.5°	0°	15°	0°	0°
D	0°	0°	0°	0°	19°	7°	—
E	0°	0°	0°	0°	0°	0°	2.5°
F	13.5°	25°	15°	4°	0°	0°	3°
G	34°	19°	11°	0°	0°	0°	0°

* Originally, these analyses were made to serve as controls for another series of experiments.

Definition of terms

Achlorhydria, hypochlorhydria, anacidity and hypo-acidity as related to patients in this series always refer to fasting states. By achlorhydria is meant an apparent fasting achlorhydria. This relates to the absence of free hydrochloric acid in a single fasting specimen and does not exclude the possibility that, either at other times or in response to stimuli, the patient may show free acid. Whenever possible we have indicated the type of acidity referred to by other investigators when including their observations for comparison.

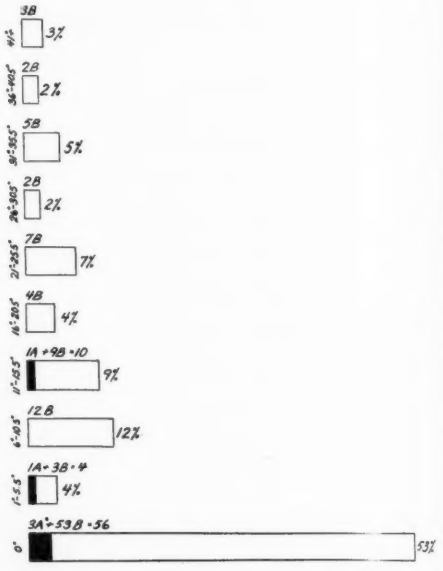
Experimental Data

The results of the analyses in the 7 cases in Group A appear in table 4. Of the 49 readings only 4 were above 20°; 19 were distinctly low, ranging from 2.5° to 20°; and, 26 showed total apparent anacidity. Four of the patients had hypochlorhydria through both test days. Patients B, F and G showed anacidity in some samples and fairly normal values in others. The average value of the seven initial tests on the first day was 7.2° and on the second day, 2.6°. The average of the entire 49 readings was 6.4°. Thus, among 7 psychotic patients, apparent anacidity occurred in 2 patients on the first day and in one on the second. None showed anacidity on both days. Patient G had gradually decreasing acidity the first day and anacidity the following day.

Initial fasting gastric hydrochloric acid levels in the 100 patients in Group B are recorded in table 5, together with those for 5 patients in Group A. (Two patients were eliminated from the latter group in tabulation because of inclusion in Group B.) Apparent anacidity was present in 53 of the 100 cases, hypo-acidity (below 19°) in 25 and a normal level (19°-40°) in 19 patients. The average of all readings was 8.9°. Of the combined groups—105 patients—56 (53 per cent) showed apparent anacidity, 27 hypo-acidity and 19 showed an average normal range. The mean for groups A and B combined was 8.7°.

Table 6 shows the distribution of the data by diagnoses. Of the 81 cases in the dementia praecox, 41 or 51 per cent had initial anacidity and 23 had low acidity, while 17 had normal values. Of the 14 cases in the manic depressive group, 10 or 7 per cent showed initial an-

TABLE 5.—Initial Fasting Gastric HCl Levels in 105 Psychotic Patients



Mean = 8.7 for 105 potients (Groups A & B). 8.9 for 100 patients (Grop B).

* Analysis of patient omitted from Group A (shaded area) because of inclusion in Group B.

† The two patients included in both groups have been recorded only once in Group B, making a total of 105 patients for both groups.

% to nearest whole number (of 105 patients). This device brings total percentage to 101.

TABLE 6.—DISTRIBUTION BY DIAGNOSIS: COMBINED GROUPS

			Units HCl							
			0°	1-5°	6-10°	11-18°	19-20°	21-30°	31-40°	41°
			Number of Patients							
Patients			(56)	(4)	(12)	(11)	(3)	(9)	(7)	(3)
Dementia praecox	(81)									
catatonic	(42)	A:	1	—	—	—	—	—	—	—
		B:	22	1	4	4	3	2	3	2
paranoid	(24)	A:	—	—	—	1	—	—	—	—
		B:	10	1	4	1	—	4	3	—
hebephrenic	(15)	A:	—	—	—	—	—	—	—	—
		B:	8	1	2	1	—	2	—	1
Manic Depressive	(14)									
manic	(9)	A:	1	1	—	—	—	—	—	—
		B:	5	—	1	1	—	—	—	—
depressed	(2)	A:	1	—	—	—	—	—	—	—
		B:	1	—	—	—	—	—	—	—
mixed	(3)	A:	—	—	—	—	—	—	—	—
		B:	2	—	1	—	—	—	—	—
Miscellaneous	(10)									
mental deficiency	(6)	B:	4	—	—	1	—	—	1	—
meningovascular lues	(2)	B:	1	—	—	1	—	—	—	—
postencephalitis	(1)	B:	—	—	—	1	—	—	—	—
psychopathic personality	(1)	B:	—	—	—	—	—	1	—	—

acidity, 4 showed low acidity and none had normal values. Of the 10 in the miscellaneous group, 5 or 50 per cent had anacidity and 3 had low values, while only 2 had normal values. These data obtained in such a small group have of course limited significance but it suggested the need for study of a larger series.

In table 7 the distribution of various levels of gastric acidity is presented according to age groups. In this series there seems to be a tendency for acidity to be lower with increasing age, as is suggested by the following data:

Of 35 patients below the age of 31, 25 or 71.4 per cent showed hypo-acidity.

Of 30 patients in the age group of 31-35, 23 or 76.6 per cent showed hypo-acidity.

Of 35 patients above the age of 35, 30 or 86.7 per cent showed hypo-acidity.

In table 8 the distribution of various levels of gastric acidity is charted according to length of hospital stay. There appears to be no relationship between these two elements.

TABLE 7.—DISTRIBUTION BY AGE GROUP (Patient Group B)

	HCl								
Age	0°	1-5°	6-10°	11-18°	19-20°	21-30°	31-40°	41-44°	45°
-20	4	—	—	1	—	—	—	—	—
21-25	3	—	—	2	—	3	2	—	—
26-30	11	—	3	1	—	2	2	1	—
Under age 31 (35)	18	—	3	4	—	5	4	1	—
31-35	16	1	5	1	3	1	2	1	—
36-40	13	2	4	4	—	3	1	—	—
41-	6	—	—	1	—	—	—	—	1
Above age 35 (35)	19	2	4	5	—	3	1	—	1
Total	53	3	12	10	3	9	7	2	1

TABLE 8.—Distribution by Hospital Stay (Patient Group B)

Hospital Stay	HCl 0°	1-5°	6-10°	11-18°	19-20°	21-30°	31-40°	41-44°	45°
1–12 mos.	12	1	—	4	—	3	—	1	—
13–24 mos.	11	1	4	—	1	—	2	1	—
2–3 yrs.	3	—	1	1	—	—	1	—	—
3–5 yrs.	4	—	1	2	1	4	2	—	—
6–10 yrs.	15	1	5	2	—	1	1	—	—
11–15 yrs.	5	—	1	1	—	1	1	—	—
16 yrs. and over	3	—	—	—	1	—	—	—	1

Summary of Results

1. The patients in Group A showed a definite tendency to fasting apparent achlorhydria and hypochlorhydria. The initial fasting specimen showed no free acid in 4 patients on the first day and 5 on the second day. The second fasting specimen (one half-hour later on the first day) revealed that 4 of the 7 attained normal levels. It is interesting to note the record of the 2 manic-depressive patients included in this group. One (Patient D) revealed an apparent fasting anacidity in 4 of 6 specimens[3]; the other (Patient E) in 6 of 7 specimens (with an acid level of only 2.5° in the last). It was these findings which led to the study of the larger group.

2. Fifty-three per cent of the combined groups (105 patients in all, since two were included in both groups) exhibited a fasting apparent achlorhydria.[4]

3. Seventy-nine per cent of the combined groups exhibited either fasting apparent anacidity or hypoacidity, taking 19° as lowest level of normal (3 patients with levels of 19°–20° are not included as hypochlorhydric); 69 per cent had fasting hypoacidity when 11° is taken as the low level of normal.

4. Fasting gastric hydrochloric acid levels ranged from 0° to 48.5°.

5. Manic depressives, in all classifications, revealed a more marked tendency to hypochlorhydria with apparent achlorhydria in 71 per cent and hypochlorhydria in 100 per cent (below 19°).

6. Schizophrenics, all types, represented so large a proportion of the cases that the findings for this group predominated. Of the 81 patients in this diagnostic category, 51 or 63 per cent were anacidic and 71 or 88 per cent were hypo-acidic.

7. The miscellaneous group of diagnoses—mental deficiency states, meningovascular syphilis, postencephalitis and psychopathic personality—was too small to evaluate.

8. An increase in incidence of hypochlorhydria correlated with increase in age (see table 7).

Of 35 patients below the age of 31, 25 revealed hypochlorhydria (71.4 per cent).
Of 30 patients in the age group 31-35, 23 revealed hypochlorhydria (76.6 per cent).
Of 35 patients above the age of 35, 30 revealed hypochlorhydria (85.7 per cent).

9. No significant relationship between length of hospital stay and gastric hydrochloric acid level was found (see table 8).

Discussion

Reference has been made above to the inadequacy of and objections to a test meal as a means of investigation of gastric hydrochloric acid secretion. Stimulation of secretion by subcutaneous injections of either alcohol or histamine was not carried out during this study. Histamine stimulation, however, was undertaken in relation to another project and has been reported separately (27). In this particular survey, it was felt that the fasting gastric juice could serve as a standardized indicator, since our purpose was not to determine the height of potential gastric function but to evaluate its day-to-day status in the psychotic as compared to the normal, compensating for individual variations by the number of cases studied.

[3] This patient revealed an apparent anacidity in 4 successive specimens during each of the following 2 days.

[4] The first specimen on the first day for patients in Group A was included in evaluating the results for the combined groups.

The normal levels of fasting gastric acidity have been recorded by several investigators. Rehfuss, Bergeim and Hawk (26) studied 13 healthy, symptomless medical students and found a range of 0 to 49 (cc.N/10 NaOH) with an average of 27.8. Later, Fowler, Rehfuss and Hawk (11) determined an average fasting free hydrochloric acid level of 18.5 (cc. N/10 NaOH) in 100 males, with a range of 0 to 65.8. Fowler and Zentmire (12) reported an average level of 15.6 (cc. N/10 NaOH) with a range of 0 to 74.5 in a series of 80 females. The distribution was not included in the data. Bennett and Ryle (2) reported their findings on 100 healthy male English medical students. They were not primarily concerned with the fasting free acid levels but did include the data in one of the tables. They recorded a range of 0 to 64 (percent N/10 NaOH) and on the basis of their distribution table an average of 11.5 per cent was calculated. In 1947, Voegtlin (35) studied nocturnal gastric acidity in normal and ulcer patients. His data on the serial determinations included a 7 a.m. fasting specimen and this was utilized for comparison with other normals and the present findings (table 9). The morning fasting specimen in 13 patients, considered normal by the author though they were hospitalized for seasickness, showed a range of 0 to 53° and an average of 24°.

Best and Taylor (4) state that the fluid removed from a stomach at rest (residual juice) normally averages 20° free acid. The average free acidity after test meal in young healthy males is about 40° and somewhat lower in females, the adult level being reached at about age of 20. "In men after 30 years, and women after 50 years a progressive decline in acidities (total and free) occurs and the incidence of anacidity and subacidity increases sharply."

Deviations in Gastric Acidity

Carlson (7) has observed that pathologic deviation in gastric acidity would be in the direction of anacidity and that it is "probable that hypersecretion associated with nervous disorders is in part secondary to gastric statis."

Many studies have reviewed the effects of somatic states on gastric juice acidity. Two recent reports demonstrate the effect of psychogenic factors on gastric acidity. Wittkower (39) thoroughly studied the response to emotional insult and observed that a majority of the subjects reacted with hypo-acidity. "The degree of reaction is subject to certain variations in the same subject on different days; the direction of reaction remains constant. . . .

TABLE 9.—Comparison of Fasting Gastric Free HCl Levels with Normals

Author	*No. Patients*	*Nationality & Occupation*	*Sex*	*Range of Acidity**	*Mean Acidity**	*% Anacidity*
Rehfuss et al.[26]	13	American Medical Students	♂ ♀	0–49.0°	27.8‡	7.7
Berglund et al.[3]	110	American Medical Students	—	—	27.5‡	40‡
Voegtlin[35]†	13	Ambulatory Hospital Patients in U. S.§	—	0–53°	24.0°	15‡
Fowler et al.[11]	102	American Medical Students	♂	0–65.8°	18.5°	—
Fowler and Zentmire[12]	79	American College Students	♀	0–74.5°	15.6°	—
Bennett and Ryle[2]	97	English Medical Students	♂	0–64.0%*	11.5%¶	—
Sackler et al.	105	Hospital Psychotics in U. S.	♀	0–48.5°	8.7°	53

* Acidity expressed in degrees of HCl or cc. N/10 NaOH in the literature is here given as degrees; if as % N/10 NaOH, the value is given with the % sign.

† The 7 a.m. fasting specimen values used for this chart were taken from the author's serial data on nocturnal acidity.

‡ Calculated from author's data.

§ Recorded in distribution table in even numbers from 0–64 and average acidity was calculated from this table; median and mode approximated from same table.

¶ These patients were hospitalized for seasickness and revealed no gastroduodenal disease in their past history.

The same emotion causes hyperacidity in one subject and hypo-acidity in another . . . ." Vanzant and Alvarez (34) reported wide fluctuations in gastric juice during periods of "mental depression," but no definite trend was established.

Comparison of Fasting Gastric Free HCl in Psychotics and Normals

The significance of the values found in the 105 psychotic females may be appraised by comparison with accepted standards. Under these, acidity of over 40° is termed hyperchlorhydria; between this and 20°, normal; below 20°, hypochlorhydria. The results may be projected against the standards by using three different criteria: 1) What is the highest acidity obtained in this series as compared with a normal series? 2) What is the percentage of patients showing hyperacidity, normal acidity, low acidity and anacidity, and how do the results compare with a normal series? 3) What is the mean value obtained in this series as compared to normal patients?

Some normal levels of fasting gastric acidity have been reported by several groups of investigators and these are compiled in table 9. Unfortunately all the data required for the evaluation of the above-listed criteria are not available, but on the basis of the obtainable data the following is elicited:

1. The highest level of fasting gastric acidity determined in this series is 48.5°. In normal patients, Voegtlin (35) reported 53°, Fowler et al. (11), 65.8°, Fowler and Zentmire (12), 74.5° and Bennett and Ryle (2), 64 (per cent N/10 NaOH).

2. (a) Percentages of fasting hyperchlorhydria in normal patients as derived from the charts—23 per cent (26, 35) and 5 per cent (2). This wide variation in supposedly normal patients is inexplicable at present. The series of psychotic patients revealed 3 per cent with gastric acidity over 40°. (b) Average fasting acidity in normal patients was reported to be 15.6° (12), 18.5° (11) and 24° (35) and calculated at 27.5° (3), 27.8° (26) and 11.5 per cent (2) from the data recorded in three additional reports. This series in psychotic patients revealed an average gastric acidity of 8.7°. (c) Hypo-acidity percentages in normal patients was also calculated from obtainable data: 74 per cent (2), 46 per cent (35), and 23 per cent (26). Our series revealed an incidence of 79 per cent below 19°. (d) Anacidity in 40 per cent of normal patients was reported by Berglund et al. (3) and was calculated from data given by Rehfuss et al. (26) and Voegtlin (35) at 7.7 and 3 per cent, respectively; 53 per cent of psychotic patients showed apparent fasting anacidity. (In view of this finding, the authors checked the incidence of peptic ulcer among their psychotic patients. During three years of institutional work only one case was noted and this in a patient not actively psychotic.)

The breakdown by diagnosis revealed an extreme degree of apparent anacidity and hypoacidity in the manic-depressive group. Seven of 13 manic-depressives (77 per cent) had an apparent fasting achlorhydria. It is possible that the known depressant effect of epinephrine on gastric secretion and acidity (22, 1) may be at play in manics.

Effects of Achlorhydria and Hypochlorhydria

In the past, some have held that a long-standing reduction in gastric juice acidity is not harmful to body function. However, vitamin B_1 is incompletely absorbed in the absence of adequate gastric hydrochloric acid, being destroyed in an alkaline juice. Bicknell and Prescott (5) state, "For the complete absorption of vitamin B_1 by mouth, it is necessary to have sufficient hydrochloric acid in the stomach." Others "have shown that vitamin C deficiency exists in most patients with achlorhydria" (5). Thus there appears to be a possible interrelationship between vitamin absorption and gastric hydrochloric acid,[5] the acid being necessary for proper absorption of vitamins B_1 and C, while, in turn, vitamins B_1 and A are needed for proper production of hydrochloric acid. Faulty absorption of vitamins, in the absence of parental vitamin therapy, may lead to an impaired nutritive state.

It is of note that a neurasthenic syndrome of thiamine deficiency has been described (6, 20, 37, 38). Wernicke's encephalopathy has likewise been related to a multiple deficiency with B_1 responsible for the mental changes (15).

[5] This paper was originally prepared in 1946. It is now recognized that gastric juice or intestinal extract is essential for intestinal absorption of B_{12}.

Similarly, a group of mental states relating to nicotinic acid deficiency has been reported: a neurasthenic syndrome, (14, 18, 30, 31) and a nicotinic acid deficiency encephalopathy.

SUMMARY

The fasting gastric hydrochloric acid level of 105 psychotic female patients indicated apparent anacidity and hypo-acidity in the great majority. Patients' age showed a relationship, while length of stay in the hospital showed no important bearing on the findings. The importance of the deleterious effects of chronic hypo-achlorhydria and achlorhydria on the nutritive state of psychotic patients is raised.

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STUDY IN SUICIDAL ATTEMPTS

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Suicide is of universal interest and importance as almost everyone has had suicidal ruminations during periods of stress. The degree of affect and actual suicidal intent accompanying these ruminations, of course, varies tremendously from person to person. It is difficult to obtain any clear understanding of suicide from psychiatric literature as there is actually a dearth of literature concerning this vital topic. To complicate the subject even further, there is much disagreement among authors concerning the basic causes of suicide. Most studies can be divided into either sociological and statistical studies (4) or Psychodynamic studies (5). These studies usually deal with a diversified age group but tend to concentrate on the older age group as age definitely lowers the threshold in regard to suicide. These studies are not particularly applicable to the military since the younger age group with much less suicidal intent is most frequently seen. This study was undertaken to obtain a better understanding of the psychosexual development and basic causes of suicidal attempts and gestures in the younger age group.

HOW MUCH OF A PROBLEM IS SUICIDE?

Although suicides are at a record low, there are still 17,000 deaths a year (7) in the United States with 100,000 suicidal attempts (9). When the number of chronic suicides (5) and accident-prone deaths are added, it becomes even more of a problem. In a study conducted at the University of Michigan Mental Hygiene Clinic (6) suicides accounted for over half the deaths in the student body in one year. Suicide is of particular interest in the Army as statistical studies reveal that suicide was a leading cause of death in the Army from 1921 to 1930. Rates of suicide are higher among officers than enlisted men, probably because of increased responsibility plus the factor of age. Men are three times as successful as women, mostly because women make more attempts in the under-30 age group. In the under-25 age group, one out of six attempts is successful while in the over 30 age group, two out of three attempts are successful (9).

STUDY

If one studies the literature one finds very little in the way of comprehensive studies of character and behavior disorders of those who attempt suicide, although in one study they constituted 23 per cent of the cases of attempted suicide (9). This study was confined to younger male military personnel and was conducted on 20 consecutive admissions for suicidal attempts and gestures. Although all psychotics were purposely excluded, it was of considerable interest that all 20 cases proved to be examples of character and behavior disorders. One criticism of this study is that many of these cases were suicidal gestures and not actually attempts. It is extremely difficult to differentiate between attempts and gestures. The method offers little help and often patients who have what appears to be little genuine suicidal drive make serious attempts. The elements of alcohol, poor judgment, and immature personality make it extremely difficult to evaluate attempts. The basic problem is that these people do seek suicide as a solution and even the most superficial gesture must indicate a basic drive in the direction of suicide. Studies which indicate the cause of suicide as 1) financial difficulty, 2) worry over studies, 3) marital difficulties, 4) various other social pressures, avoid the basic issue. What personality is so constructed that it seeks suicide as a solution to these problems which are handled in a variety of other means by the remainder of the populace? The study was undertaken to determine some of the basic personality structure and psychosexual characteristics that made suicidal attempts such an attractive solution for these people.

METHOD

The study included these three elements: 1) clinical interview, 2) American Red Cross

social history obtained from parents or surrogates, 3) psychological examinations, usually consisting of Rorschach, Wecshler-Bellevue, TAT and MAPS. No systematic analysis of this psychological test data other than summary of testing will be given in this paper. The social history placed emphasis on the following points, although deviations for specific material were usually attempted. 1) Psychosexual development—this included delivery, nature of early feeding, breast or bottle feeding and age of weaning. Special emphasis was given to the relationship between mother and patient during first five years of development. Such factors as separations, divorces, etc., were explored. Especially important was the loss of either parent at ages 4 or 14. Adolescent development was emphasized. 2) Heterosexual development was included and the area of marital adjustment was investigated. 3) Interpersonal relationships — general adjustment to school, group activities, etc. 4) Education and school adjustment plus ability to attain goals. 5) Occupational adjustment—general work adjustment, relationships with employers, etc. 6) Personality traits—general attitude toward life and evidence of depression and other mood fluctuations (cyclothymia). 7) Alcohol. 8) Attempts, gestures and even suicidal rumination.

Case Histories

Although some studies have attempted to classify character disorders who attempt suicide into subgroups, such as Teicher (9) who divided them into 1) combat fatigue, 2) attempts under influence of alcohol, 3) mental deficiencies, 4) insecurity, inadequacy and immaturity problems, no such attempt was made in this study. Several brief abstracts will be cited to demonstrate the variety of basic personality conflicts and give indication of the difference in suicidal intent.

Case 1. This 18-year-old white male was a borderline mental defective plus severe antisocial personality. This patient made a very superficial gesture by means of slashing his wrist. Reason given was that he was "fed up" with the Air Force. In one year he had four AWOLs with several court-martials. He was unable to take orders, and any delay in gratification of his desires was impossible for him to tolerate. At age 12 years he made an impulsive suicidal gesture under minimal stress. Patient had a lifelong history of impulsivity, poor interpersonal adjustment and some civilian court difficulty. Patient described a fair adjustment with mother and described relationship with father graphically as, "He's a miserable bastard." Patient indicated very poor relationship with women. Patient was totally unable to tolerate any type of anxiety. Psychologicals revealed a very immature, impulsive, acting-out severe psychopath without anxiety. Impression was that his attempt at suicide was strictly a manipulative gesture.

Case 2. This 20-year-old white male was seen after he swallowed 80 aspirin in a very impulsive attempt. He suffered from rather severe salicylate poisoning and was seriously ill for twelve days. Patient stated, "I wanted to quit but there was no escape." He was an impulsive person who was in numerous AWOL and disciplinary difficulties. He stated, "I had no family like other people and felt that no one cared." Patient contemplated suicide for several days but his attempt was quite impulsive as he noticed a bottle of aspirin in a foot-locker and gulped down the contents within a few seconds. Past history reveals that when he was four years old, his mother died and he was passed around among relatives for approximately 1½ years before residing with a paternal uncle. At age 7 he developed Legg-Perthes disease which kept him out of school. A very poor relationship with his punitive, rejecting stepfather was further strained by the added expense of this disease. Two weeks before leaving high school he quit, following repeated difficulty with the stepfather. Patient joined the Air Force and was discharged because of his old Legg-Perthes disease. He went home only to get into more difficulty and fraudulently re-enlisted in the Air Force, at his uncle's invitation and aid. At age 17, patient began drinking heavily and had continued this (20 beers per night, two to three times a week). He described an attempt at interpersonal relationships but admitted impulsivity, with hot-rod driving and frequent impulsive fighting. Father stated, "He will do anything when cornered." Psychologicals revealed an immature, impulsive individual with an IQ of 130. Patient had many strong dependency needs. Possibility of strong suicidal attempt which would appear as gestures was indicated. Summary: Impulsive character with a capacity for introjection of hostility and definite severe impulsive suicidal attempts.

Case 3. This 32-year-old white male S/Sgt with 11 years' service was admitted to the hospital after slashing his wrist and losing approximately one pint of blood before the wound was sutured. Patient stated that he was more angry than depressed. An authority figure (his Mess Captain) threatened to courtmartial him and patient in an angry gesture cut his wrist. Patient stated that this same situation had occurred eight months previously with the same authority figure and he had made a suicidal attempt at that time.

Patient proved to be a moderately compulsive person who was totally unable to express hostility to any authority figures. He denied any previous conflict

with authority. Past history: Patient's mother was described as a warm but controlling person who was quite close to the patient. History reveals patient was an extremely passive child who spent all his time in the kitchen and had no masculine drives. Patient demonstrated absolutely no interest in girls. He was noted to have much difficulty with alcohol and money in that he was always "buying friendships." Psychologicals reveal strong dependency on strong protecting females. He had great difficulty with aggressive and sexual feelings, and tendency to act impulsively under the influence of these. Hostile feelings toward military authority may easily be viewed as aggression toward own mother with resultant guilt and a suicidal solution. Summary: A moderately compulsive person without the ability to tolerate hostile impulses toward any authority figures, who sought suicide as an indirect expression of hostility against ambivalently regarded authority figures.

Case 4. This 23-year-old white male AF S/Sgt was admitted to the hospital after he had impulsively fired a .22 caliber revolver in his mouth and suffered a missile wound which entered the anterior portion of the brain with particles lodging in the right frontal and right parietal areas. Patient was surprisingly in excellent physical and mental condition upon entry into the hospital. He revealed that he had been upset over his inability to get ahead financially and was angry with his wife because she was working and had not gone out with him on the previous Saturday night. He spent all Sunday afternoon at the hot-rod races and had consumed 12 cans of beer, although he denied being drunk. He began cleaning his .22 revolver and stated that then he impulsively fired 4 or 5 times about the room and finally turned the gun on himself. Past history revealed that this individual had been an impulsive person who made a superficially good adjustment. He stated that his parents were divorced when he was approximately 13 to 14 years old and he had lived with both of them, being tossed back and forth until 16 years old, at which time he went to live by himself. Patient indicated that the divorce had been mostly his father's fault although he indicated a good relationship with both parents. Patient stated he had always been an impulsive individual and was quite interested in hot-rods. In 1949 he was placed on probation for reckless driving as he was involved in a major accident in which he was the chief offender and in which the driver of the other car was seriously injured. Patient contemplated suicide for a few days following this accident. He denied significant alcoholic difficulty but ancillary sources revealed that he was an impulsive person who was constantly carrying a revolver and demonstrating it to all concerned. Psychological examinations revealed a person of bright-normal intelligence who had some superego difficulty. They revealed many evidences of impulsivity as well as some guilt feelings about going against his mother's wishes in his present marriage. There was no evidence of depression.

In summary, we have a life-long impulsive individual who made a genuine suicide attempt under the influences of alcohol. He was able to impulsively introject his hostility and make a genuine attempt. There was no evidence of psychosis in this man.

TABLE 1.

Personality Factors	*Number*	*Percentage*
1. Impulsivity—overt 18, latent 2	20	100
2. Impulsive attempt	17	85
3. Strong maternal ties	20	100
4. Weak male identification	20	100
5. Poor heterosexual adjustment	20	100
6. Poor empathy with people	20	100
7. Number of attempts	1 — 13	65
	2 — 5	25
	3 — 2	10
8. Significant alcoholic difficulty	12	60
9. Alcohol with suicide	5	25
10. Significant disciplinary difficulty	13	65
11. Significant depression	4	20

The above cases demonstrate the variety of motivations and intents in character disorders who attempt suicide. Another interesting group which was not seen in this study was the immature male who makes genuine suicidal attempts under the stress of homosexual anxiety.

A review of the data accumulated in the study of these 20 suicidal gestures and attempts reveals the following significant data as outlined in table 1.

Impulsiveness

The most outstanding finding was that of impulsivity. In 18 of 20 cases the chief characteristic was that of impulsivity and the other two cases revealed evidence of impulsive behavior on psychological testing. The statement "I always do something and think about it afterward," was frequently heard. One patient demonstrated his impulsivity graphically by stating on one occasion he became extremely angry at a "friend" who was in a phone booth. He was so impulsive that he put his fist through the glass rather than wait to open the door to hit him. This is the epitome of a lack of latency period. Frequently these patients were race-car drivers, hot-rod drivers, impulsive fighters and demonstrated many other forms of impulsive acting-out behavior. The suicidal attempt or gesture was an impulsive act in 17 of the 20 cases.

Impulsive actions serve the purpose of escaping danger, denying danger or reassuring

against danger. The infant interprets any excitement as stress and answers this by uncoordinated motor discharge. To overcome this, one must first master motility and, secondly, acquire the ability to postpone immediate reaction. Impulsive people learn the first but not the second; they act—not think. There is no latency period between thought and action in these people. Thought and action are synonymous, and occur almost simultaneously. These patients react to any frustration with violence. This impulsivity acts not only to avoid tension, but also avoids depression and explains why these patients demonstrated little in the way of depression (2).

Depression

The correlation between depression and suicide is difficult to establish. Depression per se does not mean suicide and there must be another factor which accompanies the depression which determines if suicide is to be the solution. These patients became depressed when people did not give them enough narcissistic supplies. This tremendous narcissism prevented a higher incidence of successful suicide. Despite this narcissism, these people can impulsively introject their hostility and make genuine serious suicidal attempts. When the element of alcohol is added to cloud the judgment and poor reality concepts of these patients, suicide is certainly a strong possibility. Suicidal attempts in children indicate their reality concepts are so poor that they feel they will not really die despite rather severe suicidal attempts. Certainly these same mechanisms operate in some genuine suicidal attempts in these extremely immature, impulsive people.

Psychosexual Development

Suicide must be considered basically as the result of a major defect in psychosexual development. In these patients this was demonstrated by the strong dependent relationship with the mother and the weak superego formation as a result of poor masculine identification. Both of these factors were present in all 20 cases. These defects in psychosexual development were later manifested in extreme narcissism, poor interpersonal relationships, and lack of empathy with people. The weak object relationships and extreme narcissism were outstanding and prevented these people from a higher successful suicidal rate. The element of spite and a desire to force affection and narcissistic supplies from people (3) is extremely strong in the suicidal attempt of the patient with this type of defective psychosexual development.

Theoretical Aspects

Suicide consists of three basic elements: 1) the wish to kill, 2) the wish to be killed, and 3) the wish to die (5). Many of the patients in this study, although they presented many aspects of all three elements, would predominantly fall into the third group. The third element is a highly controversial point as one probably cannot conceive of death as an actuality. Although anyone who attempts suicide must view his existence after suicide as much happier than his present dilemma, the actual perception of death is open to question. The factors of weak ego development and poor reality concepts with the feeling that "I won't really die," are strong in this third element (1).

Summary

A study of 20 consecutive admissions for suicidal gestures and attempts, all of whom proved to be character and behavior disorders, revealed the following significant personality characteristics:

1) Strong dependency demands.
2) Strong maternal fixation.
3) Weak male identification.
4) Weak, deficient psychosexual development manifested by:
   - Narcissism
   - Weak object relationships
   - Impulsivity
   - Poor heterosexual adjustment
5) Suicidal gestures are basically an attempt to force narcissistic supplies from the environment. Despite narcissistic orientation, these patients are capable of serious suicidal attempts committed in an impulsive manner.

Practical Considerations

This study is of practical importance in that it emphasizes that suicidal attempts made in an impulsive manner with little stress and no depression indicate essentially a basic character and behavior disorder and this plus a review of psychosexual development should be helpful in differentiating these cases from impulsive schizophrenic attempts in this same younger age group.

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PHANTOM BREAST[1]

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Phantom body parts were first described in 1551 when Ambrose Paré (6) noted phantom limbs appearing to replace the amputated extremities of battle casualties. The limbs are the most frequently described phantoms. The classic description of phantoms was made by S. Weir Mitchell in 1872 (4). He described the conditions under which phantoms change form, their tendency gradually to disappear proximally, the situations in which phantom limbs moved or remain fixed, the painful aspects of phantoms, and the peculiar penetration of body and environment by moving phantoms. Since Wier Mitchell's discussions many other clinicians have described these phenomena and have offered various explanations for them. (3, 8, 9). Phantoms of limb accompanying hemiphlegia have been described (7) in the absence of amputation. Phantom parts other than limbs—including jaw, teeth, nose, penis and testicle—have been described (2) although such phenomena appear in the literature much less often than phantom limbs.

No detailed case reports of phantom breasts were found in the literature although their presence has been mentioned. Wier Mitchell in 1872 (5) wrote that another physician, Dr. Ruschenberger, USN, reported such a case to him. Gallinek, however, in 1939 (1) in a review of phantoms stated that he had never heard of a phantom breast.

In view of the rarity of descriptions of phantom breasts in the literature, we report the following remarks of 11 women interviewed at varying times following radical mastecomy. These 11 patients were part of a consecutive series of 50 patients who had radical mastectomies for cancer of the breast and who were asked the question: "Have you ever felt the presence of that (amputated) breast?" The answer of these 11 patients among the total of 50 patients indicated the presence of a phantom breast; the remaining 39 women queried did not report a phantom.

1. A 66-year-old Negro housewife with one child, interviewed 8 months after operation, stated: "It just feels like it is there sometimes. I feel as though there is a tingling and slight itching in the nipple. I feel it about one or two times a week since the incision has healed. The feeling lasts just a couple of minutes. It doesn't happen at any particular time or under any particular conditions."

2. A 43-year-old Negro factory worker with one child, interviewed 7 months after operation, stated: "Sometimes when a pain starts in the incision, it runs right down to the nipple and I feel pain in the nipple. I started to feel it about four months after the operation—after the hole got healed up."

3. A 53-year-old Negro housewife with one child, interviewed 7 years and 2 months after operation, stated: "Right after the operation I began to feel the heaving feeling of the breast or thought the breast itched me—and I'd reach over to scratch it—about one time a month, right about the time my menstrual period was due."

4. A 39-year-old Negro seamstress with two children, interviewed 1 year after the operation, stated: "The false form I wear feels natural—I always feel as though it is my own breast."

5. A 56-year-old Negro housewife with 11 children, interviewed 2 years and 6 months after operation, stated: "In the past two weeks I felt like the nipple was full like it would be when it was ready to nurse—lasts just a second—only happened that once—and I grabbed myself there."

6. A 52-year-old Negro married domestic worker with no children, interviewed 1 year after operation, stated: "About one month after the operation I began to feel a throbbing and a heaviness in the breast—used to happen about once a month. I have not felt it in the past four to five months."

7. A 39-year-old white single bookkeeper, interviewed four years after operation, stated: "I feel like the breast is shaking and moving with me as I walk—it has happened about one time a week ever since the operation."

8. A 30-year-old white secretary with one child, interviewed 2 years and 6 months after operation, stated: "I sometimes have felt a shooting pain in the breast, but it rarely happens now."

[1] This work was supported in part by a grant from the A. Atwater Kent Fund.

9. A 51-year-old white housewife with one child had both breasts removed, one 9 years and the other 4 years prior to the interview. She stated: "I occasionally have the feeling that both or one is swollen and tender as when one is menstruating."

10. A 44-year-old white housewife with no children, interviewed five years after operation, stated: "I felt the weight of the breast and often would go to put my hand to it. This started when I was still in the hospital but I stopped feeling it at after about two years."

11. A 45-year-old white housewife with no children, interviewed 2 years and 6 months after operation, stated: "In extremely cold weather or if there is pressure on the scar I feel tingling of the nipple."

Comment

From these 11 answers, we conclude that phantom breasts occur more frequently than the literature indicates. These patients all gave clear evidence of phantoms. The onset of the phantoms varied from immediately after operation to 2½ years after operation, but usually began after the incision had healed. The duration of symptoms varied; one patient felt the phantom only once while another felt it about once a week for four years. Two felt the breast during their menstrual cycles and four gave a description of sensation in the nipple. Only two of the patients reported pain, and in neither patient was the pain severe enough to require medication. The feeling did not seem to be related to difficulty with the prosthesis; in fact, none of the nine patients with phantoms who wore false forms reported any difficulty with their prosthesis, whereas 33 percent of the total of 50 patients interviewed did report some problems with their prosthesis. The patients with phantoms reported many of the same sensations described by limb amputees; i.e. itching, tingling, heaviness, motion, and pain originating in the incision and running down into the phantom. Four, or 36 per cent, gave vivid descriptions of sensation in the nipple.

Several characteristics of the 11 patients with phantoms were compared with those of the 39 patients without phantoms. The only statistically significant difference noted was the comparative ages of the two groups: the average age of those reporting phantoms was 48 years, while it was 54 years for the total cancer group. The patients with phantoms did not differ significantly from the patients without phantoms with respect to number of children, nursing of children, shame or pride in breast development, opinion as to the importance of the breast sexually, like or dislike of mothering children, age of breast development, or in the percentage who were breast-fed.

Our experience indicates that phantom body parts may be overlooked when direct questioning is omitted. The painful phantoms are relatively infrequent and patients do not spontaneously report the non-painful variety. We speculate that any body part represented in the healthy person's awareness can be represented as a phantom. It is probable that those body parts of which we are less aware, e.g., viscera, will less frequently appear as phantoms.

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SOCIETY PROCEEDINGS

NEW YORK ACADEMY OF MEDICINE, SECTION ON NEUROLOGY AND PSYCHIATRY AND THE NEW YORK NEUROLOGICAL SOCIETY

Joint Meeting, November 9, 1954

Morris B. Bender, M.D., Chairman, Section on Neurology and Psychiatry, presiding

VASODILATATION, LOWERED PAIN THRESHOLD AND INCREASED TISSUE VULNERABILITY DUE TO PERIPHERAL NERVOUS SYSTEM EFFECTS.[1] DR. FRANK N. BILISOLY, JR. (by invitation), MISS HELEN GOODELL, B.S. (by invitation), AND DR. HAROLD G. WOLFF.

The area of vasodilatation in the skin (flare zone) of the axone reflex was utilized to study the thesis that as a result of peripheral nerve action alterations occur in the tissue supplied that either damage it or make it more susceptible to injury.

It was demonstrated that the pain threshold in the flare zone of the axone reflex is lowered during the process of spread of the flare.

It was also shown that this lowered pain threshold is a manifestation of increased tissue vulnerability, so that not only do previously nonnoxious stimuli become noxious but mildly damaging stimuli become more damaging.

Discussion.—DR. HAROLD G. WOLFF: I would like to speak of the method. Obviously we would like to draw implications from these experiments; we would like to be able to say that the nervous system perhaps in a variety of ways participates in tissue damage. Unfortunately the only model we could think of to test this thesis was that described —the situations presented by the axone reflex. I want to be sure that all share an understanding of what has been done. One injured the skin in several ways: by electric current, by acid, and mechanically. Then one disregarded the area injured and studied the area of "flare," which surrounds and spreads anywhere from 2 to 3 to 10 cm. distant from the site of injury. It is the occurrence of this flare area that is dependent on dorsal root fibers. In the absence of dorsal root fibers one gets a circumscribed local tissue change at the site of injury, but not the large area of vasodilatation. It is this latter area which we have been measuring and analyzing, and which demonstrates the lowered pain threshold. To what extent automatic fibers participate in such areas, to what extent other fibers do, we do not know. We do not know whether the axone reflex participates in any physiologic way other than that associated with the vasodilatation. Suffice it to say, the argument now stands that the nervous system has been shown, by the evidence presented, to possess an equipment which can modify the integument of tissue.

DR. M. BORNSTEIN: I would like to ask if you had occasion to study a patient who by chance or by operation has had dorsal root fibers cut in which an injection can be made into the skin, and the area around that injury studied by pinprick, and if you injected histamine, did you fail to get the flare?

DR. WOLFF: There was no flare. We have done this repeatedly in patients who have had a peripheral neurectomy. If we were studying the leg, or the foot, or the arm, we found we could estimate the degree of return of function of a regenerating nerve by the size of the flare around an intradermal injection of histamine. As recovery proceeded, in the more distal portion there was no flare; in the more proximal portion there was a large flare, and as the patient recovers the flare occurs more and more distally. Observations made on the scleral portion of the eye in rabbits following dorsal root section have demonstrated relatively minor response to inflammatory agents. I do not think there is any doubt at all but that the integrity of the dorsal root fibers is necessary for the flare effects with local injury. The dorsal root fibers must be intact. Immediately following section the flare reaction is observed, but if you wait a few days so that the dorsal root fibers degenerate, then the flare or axone reflex is absent.

DR. BORNSTEIN: What I meant was in those cases where there was no flare, which you know is due to the integrity of the dorsal root, if you then inject histamine to get the local reaction, what is the effect 10 cm. away, when there is no flare reaction?

DR. BILISOLY: Outside the flare one gets results which are comparable to the control state; here you are dealing with undisturbed tissue and you find higher pain thresholds than when you move a few cm. toward the injury and into the flare zone.

DR. WOLFF: Has anyone in the audience any suggestions as to another way to approach this problem?

DR. FRANCIS ASBURY ECHLIN: I wonder if any of the neurosurgeons have repeated the observations of Foerster (*Festschrift f. Rossolimo*, 1925) on stimulation of the distal end of a cut dorsal root, in which he produced burning pain and hyperalgesia

[1] Published in *Arch. Int. Med., 94:* 759-773 (Nov.), 1954.

in the distribution of that root. He found when he cut the roots on either side of the one he stimulated the pain disappeared. In other words, the stimulation of the root did what Dr. Wolff and his colleagues have shown: it sent impulses apparently out through the afferent fibers and did something to the sensory receptors which made them more susceptible to stimulation of the skin, and this effect was abolished when he cut the neighboring posterior roots.

DR. WOLFF: The burning pain disappeared, but the vasodilatation was there, even if they were cut, as long as the afferent fibers of the part stimulated were intact. Dr. Pool has made some observations some years ago which were similar.

DR. J. LAWRENCE POOL: The observation to which Dr. Wolff referred has been corroborated by others since then: when the ulnar nerve was cut, for example by bullet or shell wound during World War II, a chronic separation of the ulnar nerve in the forearm might occur, leaving a gap of 4 or 5 centimeters in nerve continuity. After dissecting and isolating the distal stump of the nerve (for repair) under local anesthesia, and stimulating it mechanically or electrically, the patient would complain of pain in the adjacent or median nerve. The same phenomenon occurred if the chronically separated distal stump of the median nerve was stimulated: the patient would then complain of pain in the adjacent intact ulnar nerve. In these isolated distal nerve stumps running down to the hand, nothing should be viable according to expectations; yet when we stimulated or gently pinched it, the patient experienced pain in the adjacent intact nerve. We have blocked the median nerve, and again stimulated the adjacent distal ulnar nerve stump, and then found pain referred to the radial nerve distribution. Sections from these distal stumps showed, we thought, a few myelinated and nonmyelinated nerve fibers. Whether these fibers represented retrograde regeneration of autonomic fibers we could not, of course, tell. This was a real phenomenon that we cannot explain, and unfortunately could not pursue further. Perhaps it may tie in with some of your work, Dr. Wolff. (J. L. Pool: Nerve Stimulation in Paraplegic Patients by Means of Buried Induction Coil. Preliminary Report. *J. Neurosurg., 3:* 264-267, 1946.)

DR. ECHLIN: May I ask, in your experiments have you any evidence to substantiate or refute Sir Thomas Lewis's idea of a pain substance being liberated following tissue injury, and if it is this substance which renders the sensory receptors in that neighborhood supersensitive? (Sir Thomas Lewis: *Pain.* New York: The MacMillan Company, 1942).

DR. WOLFF: We do infer that there is a liberation of substances in this damaged tissue which lowers the pain threshold. According to the work of Armstrong on blister fluid, it is not histamine; it is not acetylcholine, and it is not a change in the electrolyte concentration, but it seems to resemble serotonin.

DEEP FRONTAL STIMULATION WITH IMPLANTED ELECTRODES. DR. J. LAWRENCE POOL AND DR. WILLIAM K. CLARK (by invitation).

Pain was effectively relieved for periods of 2 to 4 weeks in two patients in whom small electrodes were placed at or close to the midline just anterior to the rostral extent of the third ventricle. Pain was not relieved in two other patients in whom the electrodes were placed in the frontal lobe white matter at a more rostral or lateral position.

In the fifth patient (schizophrenia plus carcinomatosis) the psychotic state seemed definitely improved after stimulation. This patient did not show evidence of pain before or after electrode implantation.

Pain relief was judged subjectively by the patient's statements and attitude, and objectively by a considerable, lasting, reduction in 24-hour narcotic requirements.

Pain relief was spoken of by the first two patients as soon as the small current (3 to 4 milliamperes) was turned on. Control stimulations did not have such an effect. Since certain physiologic effects and pain relief could be obtained on repeating stimulation weeks later, it is felt that the stimulation rather than any tissue damage was responsible for the effects. No ill effects or distress attended these stimuli, and no infections occurred in the five patients in whom electrodes remained in place for 4 or more months.

Discussion.—DR. JOSE M. R. DELGADO: I would like first to congratulate Dr. Pool and Dr. Clark on this most exciting presentation and then to make some comments. We have been working with depth electrodes in monkeys and cats since 1948, and in human patients since 1951.

We have had an opportunity to study 22 patients in collaboration with Dr. Hannibal Hamlin and Dr. Yale David Koskoff. Of these cases, four had intractable pain, of which two were thalamic and the other two tabes dorsalis. In two of the four patients we were successful in relieving the pain by destruction of small areas within the frontal lobes. We have had no pathologic examinations of any of these patients.

During the past year, in collaboration with Dr. H. Enger Rosvold, we have studied some of the functions of the frontal lobes in the monkey. It was known that delayed-response-type test performance but not discrimination-test performance, was severely and invariably impaired after frontal lobotomy. Other symptoms, such as hyperactivity, circling, and changes in docility and in eating behavior may also appear after lobotomy. In our studies we have shown that these same effects can be produced by electrical stimulation or destruction of a very restricted area of about 2 mm. in diameter, at the level of the most anterior portion of the head of the caudate nucleus. Stimulation or destruction of other areas of the frontal pole did not produce such effects.

DR. ALEXANDRA ADLER: When comparing the method of deep frontal stimulation with that of intracerebral procaine injection for the treatment of intractable pain, will Dr. Pool please comment on the main differences as to the effect, and state which method would be preferable from the practical point of view?

DR. HAROLD G. WOLFF: Will Dr. Pool tell us the duration of stimulation and the effects observed when testing patients after deep frontal stimulation with pins or on squeezing a muscle?

DR. POOL: In reply to the first question, I have not done any of the procaine injections, but I have talked to Dr. Frank Nulsen of Cleveland, Ohio, who has done considerable work of this kind. He tells me that the effects he gets from procaine injections into frontal white matter are about the same as the effects we have reported tonight.

In reply to Dr. Wolff's question concerning the time relation of stimulation, we have shown a long chart indicating the different types of stimulation that we tested. The effective period of stimulation was about 60 seconds, and the usual effective current 3 to 4 milliamperes.

DR. WOLFF. What about testing a patient for reaction with a pin?

DR. POOL: We did not do that. We were simply observing different physiologic effects and did nothing else to interfere with the picture during the period of stimulation.

DR. WOLFF: Did the reaction to other kinds of noxious stimuli change?

DR. POOL: As far as I know, it did not. At the time of stimulation we did not test for pain perception.

DR. WOLFF: When asked about their original pain, did they think it was just as bad?

DR. CLARK: Two patients had complete relief of pain for 3 to 4 weeks each. They said they felt "wonderful" during that time. They had no difficulties, and the limitation of motion which had been present before our treatment disappeared. Later, when pain recurred, these patients reported they were just as uncomfortable as before. In one case we had good results during the first stimulation while later stimulations did not do anything. This patient complained of the same pain, and did not show objectively any apparent difference in complaints.

PSYCHODYNAMICS OF DEPRESSION. DR. MORTIMER OSTOW.

Depression is an affect which appears either in response to the loss of a love object or in anticipation of some act which would result in the loss of a love object. The characteristic psychic and physical components of the depression syndrome can be understood as a device to compel protective acts on the part of those who love the patient. When depression follows an externally imposed significant loss, it may be considered normal. When it follows no loss or a trivial loss it is pathologic. In such a case the depression is provoked by the unconscious fantasy that a wish to destroy or injure the love object has been realized. However, the ensuing depression is usually not successful in terminating the hostile tendency which continues to express itself against love objects in passive and indirect ways and because of the guilt which the aggression evokes, reflexively in self-destruction.

Discussion.—DR. PAUL FRIEDMAN: I feel very flattered to have been chosen by Dr. Ostow to discuss his paper. You all share my opinion, I am sure, that he has given us a lucid, concise survey of this very difficult and complex subject. I was more privileged than you, since I was able to read the full text of the paper which he could present here only in part. He succeeded in reviewing all the important psychological mechanisms that are involved in the dynamic process of depression: identification, introjection, guilt, and, above all, the vicissitudes of aggression. However, I cannot resist referring to one of the earliest illustrations of the most pathognomonic mechanism of depressing: namely, introjection.

In recent times it has been speculated, in some analytic quarters, that electric shock might produce a violent motor discharge of aggressive tension. I wonder if sufficient data have been collected to substantiate this speculation; in other words, if the suicidal tendencies really have been found to subside after the administration of electro-shock? I wonder if Dr. Ostow would care to comment on this question.

DR. OSTOW: Dr. Friedman asked whether one can make a statement that electric shock discharges aggressive tensions. I doubt that electric shock therapy has any specific effect in dissipating aggressive tendencies. It is my impression that whole psychic constellation, which includes depression as its affect, is dissipated by the electric shock.

TRANSFERENCE PROBLEMS IN CONNECTION WITH SHOCK TREATMENTS AND PSYCHOSURGERY. DR. LOTHAR B. KALINOWSKY.

Psychiatrists applying somatic treatments and psychoanalysts are so far apart in their concepts that studies to evaluate phenomena like transference and countertransference during somatic treatments have never been undertaken. Insulin coma treatment, electric convulsive treatment and psychosurgery offer interesting but quite different problems in this respect. Insulin coma treatment is that type of somatic therapy during which a rapport between physician and patient can be best established. Many clinicians feel that the patient's attachment to the physician is an important factor for the results obtained, but this has never been proved. In electric shock therapy the psychopathologic manifestations differ from the hypoglycemic state because the patient immediately falls into a deep unconsciousness, has an amnesia for the whole procedure, and the psychotherapeutic situation is further complicated by the ensuing confusion. Electric shock therapy has been considered as a mere adjunct to psychotherapy. Although it is possible to make patients more accessible to psychotherapy by means of two or three electric shock treat-

ments, attempts to improve transference by this method are unsatisfactory. Psychosurgery changes the psychotherapeutic rapport with the patient by the modification of his emotional state and by the personality changes in the sense of a frontal lobe syndrome.

Discussion.—DR. PAUL H. HOCH: I think Dr. Kalinowsky gave a very good and very complete review about the rapport situation in patients who receive shock treatment or who undergo psychosurgical procedures. I cannot add very much to his discussion. I would like to remark that unfortunnately our psychotherapeutic attempts are not very fruitful in those patients who receive all kinds of psychiatric treatment and fail and they are operated on and fail with the operation, and now after an operative failure undergo psychotherapy. Here usually psychotherapy does not produce more than it produced before the operation.

A CONTROLLED INVESTIGATION INTO THE VALUE OF CHLORPROMAZINE IN THE MANAGEMENT OF ANXIETY STATES. DR. CARL LAMBERT.

Dr. Lambert gives an account of a controlled therapeutic trial of chlorpromazine in a group of 150 out-patients with anxiety states which he conducted in collaboration with Dr. Linford Rees, Consulting Psychiatrist, Maudsley Hospital, London. He summarizes his finding in the following three points:

1. Utlilizing the double blind method and other controlled procedures, it was found that the results obtained by chlorpromazine were significantly better than with inert tablets.

2. Extended trial with chlorpromazine at optimum dosages resulted in 54 per cent of the group showing marked or moderate symptomatic improvement. Two-thirds of these patients relapsed after a few weeks of clinical improvement despite continued medication with chlorpromazine.

3. This high tendency to relapse together with the development of side-effects considerably limits the value of the drug. The usefulness of chlorpromazine in anxiety states would appear to be largely restricted to short-term symptomatic treatment and management.

Discussion.—DR. HERMAN C. B. DENBER: It is indeed a pleasure to discuss these valuable contributions to present-day psychiatry. There is no question in anyone's mind that chlorpromazine has taken a place in the treatment of psychiatric disorders for some time to come. Whether or not this will be the final answer, or only the beginning of the search for the final answer is another question.

There is complete agreement on Dr. Hoch's indications for chlorpromazine treatment. With respect to the dose, Dr. Hoch advocates a rapid build-up with high doses of chlorpromazine. There is a great controversy at this time between psychiatrists in the United States and Europe concerning this question, for the doses used in Europe are far smaller than they are here. I was recently privileged in being able to make a survey of 14 psychiatric hospitals in England, France and Switzerland, to study this question. It became apparent that cultural and psychodynamic factors enter into the content of the psychosis; extremely agitated patients are not usually found in English mental hospitals. The doses used are lowest in Great Britain, and higher in France. It would seem that the clinical effect is proportional to the time-dose ratio. Even with a low dose (50 to 300 mg. daily), if one waits long enough (3 to 6 weeks for acute cases and 6 to 9 months for chronic cases), the desired effect will be achieved. I do not believe that pushing the dose even to 1,000 mg. daily in the first few days is any more effective than starting with a low dose and waiting. All that the high dose seems to do is to increase the possibility of side-effects. The results all over Europe have borne this out.

The high incidence of Parkinson syndrome noted in Dr. Hoch's cases may be attributed to (a) the high dose he used or (b) that he may be dealing with a different patient population than elsewhere.

DR. IRVING S. DRIBBEN: I thought it might be of interest to mention that we have been working on this problem in Albany. We started in 1955, and we have about 750 cases. The material is chiefly psychiatric, but there is also some neurologic material. I was interested to hear both Dr. Hoch's and Dr. Lambert's papers, and in general, I would say that up to this time, our results would support their findings.

We have never seen a typical, complete Parkinson syndrome. All we have seen is just the mask-like facies. Dizziness is a very common symptom, and we have seen jaundice about three times in our series. Our percentage would seem to be less than those reported, 3 in 750 would run to less than 0.5 per cent.

I would I would summarize by saying it is our feeling at this time that chlorpromazine does have value symptomatically.

DR. HOCH: I would like to thank the discussers. Dr. Nolan Lewis once made a remark that when a new treatment comes out everyone should hurry to use it, because if you do not hurry, very soon the treatment will not be used any more. We have seen this repeatedly in psychiatry, but I feel that in this drug we have a little more than a passing therapeutic fancy, but I also feel that this drug will be supplanted rapidly by other compounds which will be more effective and will have less side-effects than chlorpromazine itself.

The question arises, and this is important, what is the optimum dosage? An optimum dosage does not exist; in each patient it has to be determined individually, and I fully agree that a small dosage should be used first and then gradually built up. On the other hand, if you try to build up dosages slowly, the patient may develop tolerance to the drug. It is preferable to build up the drug more rapidly in undesponding patients, increasing the dose by 50 mg. daily.

DR. LAMBERT: I have really nothing to add, except to say that we very much share the conservative attitude that Dr. Hoch adopted.

NEW YORK NEUROLOGICAL SOCIETY AND THE NEW YORK ACADEMY OF MEDICINE, SECTION ON NEUROLOGY AND PSYCHIATRY

Joint Meeting, December 14, 1954

E. Jefferson Browder, M.D., President, New York Neurological Society, presiding

DISTANT ISCHEMIC LESIONS WITH CEREBRAL ANEURYSM. DR. IRWIN FEIGIN.

Congenital cerebral aneurysms commonly cause lesions by rupture into the subarachnoid or subdural spaces or into the substance of the adjacent brain, or by compression of adjacent tissues when the aneurysm becomes large. More rarely, distant ischemic lesions may occur. These may be found in the distribution of the artery on which the aneurysm is located. In such case, it may be postulated that the aneurysm itself, or the surrounding hemorrhage following rupture, may partially compress the vessel so that blood flow becomes inadequate and encephalomalacic changes may occur in critically deficient tissues. It is also possible that small emboli may pass into the vessel from a thrombus within the aneurysm, and block a distal branch causing encephalomalacia. In other cases in which the aneurism has caused increased supratentorial pressure, a herniation of one or both unci through the tentorial notch may cause lateral compression of the midbrain and narrow or block some of the vessels to the brain stem causing hemorrhages and softening in the midbrain or pons. Similarly, one or both posterior cerebral arteries may be narrowed causing encephalomalacic changes in the occipital lobes. Uncal herniation with these sequelae is more commonly described with neoplasms. Two illustrative cases were presented.

Discussion.—DR. SIDNEY W. GROSS: Dr. Feigin's presentation calls attention to another important lesion which may be associated with a cerebral aneurysm. It is commonly thought that rupture of a cerebral aneaurysm means blood pouring out into the subarachnoid space. Actually in most patients, in addition to the rupture of the aneurysm, there is nearly always an associated intracerebral lesion at the site of rupture. In aneurysms of the anterior communicating artery it is common for the aneurysm to rupture into both frontal lobes and to produce bilateral abnormal signs. Dr. Feigin calls attention to compression of the posterior cerebral arteries due to aneurysm where there is increased intracranial pressure and uncal herniations. He does not imply that this is unique to intracranial aneurysms. He showed a tumor in which this occurred also. Uncal herniations occur in traumatic situations as well. Emboli breaking off at the site of the aneurysm and producing lesions at a distance have been alluded to. Whether or not this occurs still remains to be proved, but it is a possibility. Blood in the subdural space with intracranial aneurysms has been encountered on several occasions. Whether or not spasm occurs along the course of a cerebral vessel which harbors an aneurysm is still unproved, although there is some evidence that it probably does. An aneurysm which arises near the take-off of the middle cerebral artery may produce spasm along the entire course of the middle cerebral artery and thus produce symptoms at a distance.

PNEUMOENCEPHALOGRAPHIC AND NEUROLOGICAL STUDY FOLLOWING PSYCHOSURGERY. DR. MARCUS P. ROSENBLUM, DR. LEROY BARNES (by invitation), AND DR. WILLIAM EHRLICH (by invitation).

A study was made of 100 chronic psychotic veteran patients, mostly suffering from schizophrenia, who underwent the routine type of prefrontal lobotomy (Lyerly Poppen modification). Thirty per cent of this series developed seizures, and of this number 25 patients were selected for pneumoencephalographic and other studies; these formed the basis for this study. Sixteen patients (64 per cent) suffered a maximum of one to four seizures. However, four other patients developed status epilepticus. Seventy-two per cent of the entire series developed seizures within 9 months following prefrontal lobotomy. EEG studies disclosed 8 cases with focal EEG abnormalities, predominantly in the frontal lobes; 13 with nonfocal EEG abnormalities, and 4 with normal EEG. Three patients had persistent neurologic disability of a nonincapacitating type. Pneumoencephalographic studies disclosed characteristic and predominant dilatation of the anterior horns in all the patients. In addition, 6 of the 25 patients suffered from porencephaly at the site of lobotomy. Comparison of postlobotomy air studies and nonlobotomy air studies for a variety of neurologic disorders emphasizes preponderant dilatation of the anterior horns of the lateral ventricles.

Discussion.—DR. JACK LONDON: Would you have any statistics which would show whether the anterior horn was cut at the time of operation? If so, did those patients develop porencephalic cysts or show any other abnormalities?

DR. ALEXANDRA ADLER: Since this is an investigation on patients who had epileptic seizures, I wonder whether the dilatation of the anterior horns might be related to that specific group, in other words, whether you should assume, or whether you have any indication, that this dilatation of the anterior horns would be present in patients without seizures?

DR. JOSEPH RANSOHOFF: I think this series has a rather high percentage of seizures following lobotomy procedures. Dr. Hoch, I believe, will correct me if I am wrong, but I believe our percentage at the Psychiatric Institute is somewhere around 10 per cent and we have had 300 cases. I wonder whether the use of the sucker to do the lobotomy might not be incriminated in both the production of the porencephalic defect, which was so beautifully demonstrated, and in the high seizure incidence.

DR. STANLEY LESSE: I would like to raise the possibility that the large percentage of seizures presented here might be, in part, due to the fact that the lateral cuts were not done under direct observation. I wonder if you are not actually cutting into the grey matter when you do these lateral cuts. In reality there is very little left of the fronto-thalamic fibers lateral to the medial cut and any blind lateral sweep has great likelihood of cutting into the grey matter of the convexity.

DR. PAUL H. HOCH: I also found the percentage of seizures in Dr. Barnes' cases relatively high. As Dr. Ransohoff has mentioned, in our material at the Psychiatric Institute the seizure incidence is about 10 per cent in the lobotomies. I would like to ask Dr. Barnes if all the lobotomies performed in his cases were made at the coronal plane or anterior to it, and how the seizure incidence in his material relates to the place of a cut coronal or precoronal in localization.

DR. ROSENBLUM: In reference to the higher incidence of seizures, one is able to detect convulsions more readily in patients under careful hospital surveillance than from discharged patients. Seizures frequently occur at night and unless these are observed they may be omitted in the report of patients at home. Thus, the hospital setting provides greater opportunity for accurate survey of postlobotomy seizures.

DR. EHRLICH: We do not have any definite statistics on the number of times the anterior tip of the ventricle was entered into. When this occurred it was noted on the opertaive records, and, I am sorry to say, that this is not investigated for this work. As well as I can recollect, it seems to me one ventricle was entered into in about one-tenth of the cases done. I might say that the postoperative course, when this occurs, is about the same as in those cases where it does not occur.

In reply to the question as to where the leukotomy incision is made, we try to make it just anterior to the coronal suture. The one-inch trephine opening is made directly over the suture line and the incision in the cortex is made in the center of the gyrus directly anterior to it. However, sometimes the direction of the gyri and the location of large blood vessels make it necessary to make the incision further forward or backward. The lateral recess has not been cut since May, 1953, since which time the leukotomy incision is limited to the mesial two quadrants.

DR. BARNES: There were two questions I would like to comment on: as concerns the findings in air studies on postlobotomy patients who did not have convulsions, we had pneumoencephalograms on only a few such cases. They showed similar changes. Unfortunately, as we began our studies on the cases with convulsions, we have not had air studies on enough of the nonconvulsive patients to get that information. It would appear to me so far that they show the same changes.

As concerns the operations entering the anterior horn, I checked the operative notes on the cases of porencephaly, and in none of them did I find a note stating that the anterior horn had been entered.

INVESTIGATIONS ON CHLORPROMAZINE IN PSYCHIATRIC PRACTICE. DR. PAUL H. HOCH, DR. JAMES P. CATTELL (by invitation), DR. SIDNEY MALITZ (by invitation), AND DR. STANLEY LESSE (by invitation).

The paper discussed the clinical use of thorazine on inpatients and ambulatory patients. Statistics were presented indicating that from 42 out-patients who were very carefully studied and observed before, during, and after thorazine medication 5 were much improved, 22 improved, 7 unimproved, and 8 worse. From 26 in-patients, 4 were much improved, 7 improved, 14 unimproved, and 1 worse. A marked individual variation in dosage was observed in these patients who received thorazine predominantly orally. Some of the in-patients started out with intramuscular injections and were later changed to oral dosages of thorazine.

The optimum dosage has to be found for each patient. Some patients need comparatively small amounts and others a fairly high amount of thorazine. Some patients who receive thorazine develop an adaptation to the drug and in such cases the dosage has to be increased. Thorazine can be withdrawn rapidly from patients if necessary and no withdrawal symptoms have been observed. All in-patients were treated on the average of 4 months and out-patients were treated about 8 months. Practically all our patients showed a return of symptoms when the use of the drug was discontinued. The results in our series were unpredictable. Some patients responded dramatically; others with similar symptoms did not respond at all. Some patients showed only a reduction in their symptoms. In many instances the emotional tension was reduced without removing the symptoms themselves. This was especially true in psychotic patients where the basic condition remained untouched by the drug.

The paper also discussed the complications occurring with the use of thorazine. The following side-effects of the drug were observed: rash, double vision, swallowing difficulty, lactation in some female patients, constipation, epigastric pain, hepatitis, grippe-like syndrome consisting of elevated temperature, joint and muscle pains, nasal stuffiness, dry throat, and malaise, and a typical Parkinsonian syndrome. In addition we sometimes saw nausea, vomiting, vertigo, diarrhea, and a raising of the con-

vulsive threshold by the drug. Besides the physical side effects we also saw psychiatric ones in which the patient complained of apathy, lassitude, and indecision while under the drug and at times psychotic manifestations were released in some patients. Some patients complained about unpleasant dreams and at times disinhibited sexual behavior was observed. It is interesting to note that while most patients feel sedated under the drug, there are a few where it creates a great deal of tension, restlessness, and a "driveness" is present. All complications which we observed were bothersome but not serious. There were no deaths or other serious complications in our series.

BOOK REVIEWS

Heath, Robert G., STUDIES IN SCHIZOPHRENIA: A MULTI-DISCIPLINARY APPROACH TO MIND-BRAIN RELATIONSHIPS. [Tulane Department of Psychiatry and Neurology. Cambridge, Mass: Harvard University Press, 1954. Pp. XIV + 619, . . .]

This is a rather elaborate report of a long year's work by a team which brought together the skills and techniques of psychiatry, psychology, neurology, neurophysiology, neurosurgery, biochemistry, and physiology in an attack on this problem. The basic theoretical assumptions were first established in animals (cats and monkeys). The theory, briefly, is that certain areas of the septal area of the mid-brain (studied by electrical stimulation and recording) constitute a hypothetical circuit that facilitates mental and bodily processes, while in the same area there are other pathways that constitute a circuit which suppresses these same activities. Physiological, behavioral, biochemical and mental changes seem to reflect the activity of this area. This was a holistic approach to the ancient mind-brain problem, using fine electrodes inserted in the human brain and stereo-taxic techniques. When these "circuits" were stimulated dramatic effects were observed in both humans and animals.

Schizophrenic patients (19 in number) seemed to show an abnormal spiking on the EEG recorded in the key areas in the facilitatory circuit; "control" patients did not present these "abnormal" electrical findings. This was not a shock method; the brain area involved was not mutilated. Fifty per cent of the patients improved sufficiently to leave the hospital. (This is the seeming "breaking point," no matter what method of treatment is used in schizophrenia up to the present time.)

The author's operational concept of schizophrenia is that of Bleuler. The conventional psychoanalytic framework for the integration of the mind was not an adequate working hypothesis for this team. Curiously enough, Bleuler accepted thirty years ago more of the Freudian hypothesis than do our authors who feel that "the organization of the mind into id, ego, and superego provided no basis for an understanding of the mechanism of schizophrenia." True, the Freudians may be able to give us no etiological basis of explanation but no one would deny that they have provided us with our best psychopathology for this disease to date. Rado's concepts and formulation are, however, accepted by the authors.

This handsome and carefully assembled volume contains chapters on the team's ablation studies in animals and humans, and descriptions of the surgical techniques involved. Much of the physiological, biochemical, and psychological data are presented. One hundred pages are devoted to case reports.

The next to the final section consists of some interesting reports of discussions held on this work by such people as David M. Levy, Mettler, Carney Landis, J. C. Lilly and James B. Campbell. The majority echo a sense of caution and moderate skepticism, but all indicate that a longer follow-up of the cases is needed. It is also indicated that the work was worth-while and should be continued. The whole experiment certainly opens up wider fields for further research and therapy.

JOSEPH ZINKIN.

Gill, Merton, Newman, Richard, and Redlich, Fredrick, C., THE INITIAL INTERVIEW IN PSYCHIATRIC PRACTICE: WITH PHONOGRAPHIC RECORDS. [New York: International Universities Press, 1954. Pp. 423, $6.00.]

The establishment of a high-fidelity sound recording laboratory at Yale permitted the work of recording and observing the psychiatric interviews and the collection of the data for the present volume which is a product of the Yale University School of Medicine's Department of Psychiatry. This appears to be the first systematic attempt to publish the combined printed word and sound record for didactic and scientific purposes in the field of

psychiatry. It should really mark an important step forward to a more scientific and controlled teaching of psychotherapeutics. Psychiatry has perhaps had to wait on the electronics field for this step ahead.

The importance and difficulty of the initial interview is a commonplace in psychiatry, and the desire of the authors to begin at the beginning is easily understood.

Three patients are presented. Two are psychoneurotics, and one is a hospitalized schizophrenic. The authors assume that the basic principles of the initial interview in both types of patients are essentially the same. This itself raises some questions in the mind of this reader. Two of the therapists are experienced psychiatrists, while the third is a medical student interviewing one of the neurotic patients. This interview by a novice is included to highlight the mistakes of a beginner who is organically oriented. Permission was obtained from the patients for publication of the records. Excellent anonymity was obtained by proper camouflage by deletion.

It is noted by the authors that considerable experimentation and much trial and error were required as they gradually learned to approximate the necessary combination of tolerance and objectivity needed for this kind of work. The reports are essentially verbatim, and are far more vivid and instructive on the phonograph than in print. The real essence of the material of this very human interchange comes out best in sound—all the subtlety, nuances, and delicacy of meaning are clearly recorded on the sound track. The dead weight of the printed word when it is used as a faithful transcript of human conversation is well illustrated by a comparison of the phonograph record and the book.

Part I of the book briefly surveys the literature on interviewing. Then it goes on to develop the authors' own approach, which advocates "spontaneous" development of each interview in following the patient's lead. Part II consists of the three verbatim, unedited interviews with carefully detailed comments and criticisms of the authors' techniques, thus illustrating their principles of interviewing. In general, one can hardly quarrel with either their principles or practice. This is a sound useful approach, and should prove invaluable in teaching and in learning. There is a bibliography and index.

JOSEPH ZINKIN.

Bach, George, R., Ph.D., INTENSIVE GROUP THERAPY. [New York: The Ronald Press Co., 1954. Pp. XI — 446, $6.00.]

The author is presently a practicing clinical psychologist. He is a former teacher, and was research assistant to the late Kurt Lewin. Having worked with group therapy for some 10 years, he here attempts to set down both his theory and practice. The author strongly believes "that although a few of the basic concepts developed by the individual approaches are extremely useful in clarifying some parts of the group therapeutic process, clinical experience in the intensive use of groups shows that a group therapist must have concepts that go beyond those employed in individual therapy." He feels that a group therapist must be able to recognize and utilize a set of psychological forces operating in group situations which Lewin had started to investigate under the heading of "group dynamics." Thus he hopes that this combination of Lewinian concepts and general eclecticism will lead to new conceptual tools. Into all this is thrown a bit of psycho-drama, dream reporting, and projective drawing. The author is eclectic enough; Sullivan, Horney, Lewin, Jung, Frank, Freud, and others contribute to his set of theoretical concepts. No one can deny him the virtue of tolerance.

The first part, consisting of one half the book, is devoted to clinical techniques; the other half to therapeutic effects, and a discussion of group dynamics in the therapeutic process. In this final part, he attempts to develop a theory of group life and interpersonal "contact operations." He is quite concrete and clear in his descriptions of the actual techniques he uses; in this area he can be extremely helpful to those seeking practical methods used in working with groups. Yet it is clear that he has spread his net far too wide. The author is not able to make the necessary integrative synthesis he desires in his theoretical concepts on group therapy and dynamics. The time, perhaps, is not yet ripe.

It is interesting to note that Bach believes that normal people are not so likely to develop group situations into therapeutic media because they have less need to overcome feelings of social isolation, or to have to maneuver people into neurotic behavior. This would be all very helpful if we only knew what is a "normal person" and how he behaves. There is a marked neglect, and perhaps misuse of Freudian concepts which will make for distrust on the part of readers who have greater confidence in genetic concepts than has the author.

Directed to group therapists, the book is certainly of value also to social psychologists and social scientists interested in the interaction of individuals in groups.

JOSEPH ZINKIN.

Braatoy, Trygve, M. D., FUNDAMENTALS OF PSYCHOANALYTIC TECHNIQUE. [New York: John Wiley and Sons, Inc., 1954. Pp. XI + 404, . . .]

This volume was written while the author was working at the Menninger Foundation as a training analyst during his 2-year stay (1949-50). Before his untimely death in 1953, this Minnesota-born Norwegian psychiatrist and Psychoanalyst had gained a fine reputation as the head of the Psychiatric Department of the Ulleval General Hospital in Oslo between 1945 and 1952. A graduate of the University of Oslo (1929), and of the Berlin Psychoanalytic Institute, and analyzed by Fenichel, he was well equipped for the writing of this volume.

The author was gifted with a lively, intimate, personal, and dramatic style which is both unusual and provocative in this field. It is to be noted that there is a rather unusual and effective sequence of approach in this work. The author begins with an analysis, description and discussion of the countertransference. This is the point at which most discussions usually end. It is a most justifiable approach for the trained and experienced analyst, but something a little less desirable for the beginner in that it may arouse some confusion. Yet this is so basic a problem in analytic work one cannot but admire his boldness of reasoning.

The nine following chapters center on the importance of description in analysis, the patient's words and behavior during treatment, the various aspects of the unconscious, and infantile experiences related to present behavior. All this must fit what the therapist can see, hear, and feel directly with and from the patient. Throughout, the author's psychosomatic interests are revealed in his deep respect for the biologic and physiologic aspects of analytic technique. The book ends where most begin, with a sound and thorough discussion of the special as well as the general problems of interpretation. There is a wealth of illustrative clinical material, case histories and research findings which remove any feeling of discussion in a vacuum of abstract theory. He leans heavily on Ferenczi, Reich, and Lewin among those who have added something to the Freudian heritage. The concise clarity and deep vitality of this work cannot help but make one believe that it will certainly have a stimulating and beneficial effect on the course of students' and psychiatrists' learning. It can be considered a distinguished close to a useful and honorable medical career.

JOSEPH ZINKIN.

Franz Josef Kallman, HEREDITY IN HEALTH AND MENTAL DISORDER. [New York: Norton & Co., Pp. 315, $6.00.]

Kallman, principal research scientist at the New York Psychiatric Institute and a geneticist of note, was accorded the honor of delivering the nineteenth Salmon Lecture Series and this volume is the expanded and illustrated report of those lectures. The foreword is contributed by Nolan D. C. Lewis.

The work consists of an interesting and comprehensive report of the numerous data collected in the area of psychiatric genetics over a long period of time in an extended experiment. It is obvious that one's knowledge of psychiatry cannot be complete without some understanding of the role of genetics and the present author sets out to make that knowledge complete and palatable.

The present research is concerned with the reactions of twins, of whom there are more than one and a half million pairs available for study in the U.S. Approximately one-third of these are of the monozygotic type. After a

historical description of the evolution of modern genetics and an outline of the way the geneticist works, he illustrates his discussion with pictures of one- and two-egg twins at various ages. His findings suggest that capacities for health and satisfactory adjustment have biological properties and that heredity is of the greatest importance.

The second portion of the book presents evidence collected by the author of genetic phenomena in the psychiatric disorders encountered in daily practice. Nearly the entire field is covered and the material is generously illustrated. This section contains the main body of findings.

There will be little question regarding the validity of the data collected but there will be some disagreement regarding the conclusions drawn from some of these data. As an instance: "Obviously these twin data throw considerable doubt on the validity of purely psychodynamic theories of certain types of homosexual behavior in adulthood while strengthening the hypothesis of a gene-controlled disarrangement in the balance between male and female maturation (hormonal) tendencies." "In any case the intersexuality. theory or more precisely the genetically oriented imbalance theory, although still based on statistically insufficient and cytologically unconfirmed evidence (Slater-Lang), can no longer be regarded as an implausible explanation for certain groups of male homosexuals."

The book is authoritative and is exceedingly worth reading and studying.

FRANCIS J. BRACELAND.

BOOKS RECEIVED FOR REVIEW

FEBRUARY 1955

EISSLER, K. R. *The Psychiatrist and the Dying Patient.* International University Press, New York, New York.

HOMBURGER, F. *The Medical Case of the Aged and Chronically Ill.* Medical Press, Boston, Massachusetts.

MICHAELS, J. J. *Disorders of Character.* Charles C. Thomas, Springfield, Illinois.

WEITBRECHT, H. J. Kritik der Psychosomatik. Georg Thieme Verlag, Stuttgart, Germany.

WIECK, H. H. *Zur Psychologie und Psychopathologie der Erinnerungen.* Intercontinental Medical Book Corporation, New York, New York.

NOTES AND NEWS

SECOND INTERNATIONAL CONGRESS OF NEUROPATHOLOGY

The Second International Congress of Neuropathology will be held in London, September 12-17, 1955, and is being organized by the British Committee to the Congress.

Messrs. Thos. Cook & Son, Ltd. were appointed as official agents for traveling arrangements.

The preliminary meeting for the Second International Congress of Neuropathology held in London on July 15, 1954, proposed the following main topics for discussion in plenary sessions:

1. Cytochemistry of the neurone in relation to injury and other environmental changes, excluding lipoidoses.
2. The blood-brain barrier in inflammation and allergy.
3. Problems in the malignancy of gliomas.

Besides the plenary sessions where the three main topics will be discussed, separate free sessions would be organized to which papers not exceeding 10-15 minutes in length of presentation will be welcome.

It was agreed that any papers submitted should preferably be submitted to the national committee of the contributor's country. In the United States a committee has been formed which consists of the following members:

Dr. B. J. Alpers
Dr. C. E. Benda
Dr. D. Denny-Brown
Dr. W. Haymaker
Dr. J. W. Kernohan
Dr. A. Wolf
Dr. L. Roizin
Dr. G. Jervis
Dr. A. Weil
Dr. A. E. Walker
Dr. R. Richter
Dr. F. Forster

The chairman of this committee, appointed by the American Association of Neuropathologists, is Dr. Armando Ferraro, 722 West 168th Street, New York 32, N. Y.

Members of the American Association of Neuropathologists, members of the American Neurological Association, members of the American Psychiatric Association and members of the American Association of Pathologists interested in presenting papers dealing with neuropathological problems are cordially invited to submit such papers to the American Committee.

RORSCHACH TEST WORKSHOPS

The Department of Psychology, University of Chicago, announces its 1955 summer workshops in the Rorschach Test, to be conducted by Dr. S. J. Beck, the weeks of July 11–15 and July 18–22. The basic processes in test evaluation will occupy the first week's workshop, and it will demonstrate full test interpretation. The second week will be devoted to problems of advanced clinical interpretation, exemplified by children in more disturbed states and by adults in milder neurotic conditions. Workshop I may be taken by students at, or ready for, the interne level. Admission to Workshop II is limited to psychologists and psychiatrists in clinical positions or practice. Each seminar will meet for two 2-hour sessions per day. For full information, write to the Executive Secretary, Department of Psychology, The University of Chicago, 5728 South Ellis Avenue, Chicago 37, Illinois.

CENTENNIAL OF SAINT ELIZABETH'S HOSPITAL

On January 15, 1855, Saint Elizabeth's Hospital, in Washington, D. C., admitted its first patients. This year it celebrates its centennial. Now a component unit of the U. S. Department of Health, Education, and Welfare, it was established by Act of Congress as the Government Hospital for the Insane. Dorothea Lynde Dix (1802-1887), one of the most remarkable women America has produced, was responsible for this action by the Congress,

and her name will be given this year to the new 420-bed Admission and Treatment Building at Saint Elizabeth's, the Dorothea Lynde Dix Memorial Pavilion.

On May 5 and 6, 1955, there will be held at the Hospital a 2-day meeting with invited guest speakers of international repute. An historical pageant depicting the life and works of Miss Dix, planned, written, and enacted by patients of the Hospital, will also be presented at this time.

RESIDENCIES IN PSYCHIATRY

The Veterans Administration Hospital, Lyons, New Jersey, has available residencies in Psychiatry for a 1- to 3-year period which are fully accredited by the American Board of Psychiatry and Neurology. The training program consists of lectures, conferences and seminars under the direction of the Department of Psychiatry, New York Medical College, and offers intensive training, both intramurally and through rotation in special hospitals and clinics in the adjacent area. There is, in addition, a series of extensive guest lectures as well as an Annual Institute at the hospital. Training may commence at any time.

RETIREMENT OF ADMIRAL BOONE

The retirement of Vice Admiral Joel T. Boone, (M.C.), U. S. Navy, Rtd., as Chief Medical Director of the Veterans Administration has been announced by Harvey V. Higley, Administrator of Veterans Affairs.

At the same time, Mr. Higley said Dr. William S. Middleton, Dean of the University of Wisconsin Medical School since 1935, would succeed Admiral Boone effective March 1, 1955.

The position of Chief Medical Director in the VA entails responsibility for conduct of the biggest medical program in the United States. The VA presently is operating 172 hospitals which care for nearly a half-million veteran-patients each year; provides daily domiciliary care for nearly 17,000 veterans, and operates 105 clinics serving more than 140,000 veterans each month.

The Eightieth Annual Meeting of The American Neurological Association will be held at the Palmer House, Chicago, Illinois, June 13-15, 1955.

Dr. Wilder Penfield of the Montreal Neurological Institute received the honorary degree of D.Sc. of Leeds University on November 5, 1954.

Ernest M. Gruenberg, M.D., executive director of the New York State Mental Health Commission, has resigned his post to accept a position with the Milbank Memorial Fund. He assumed his duties as a senior member of the technical staff in charge of the Fund's mental health activities on January 1, 1955.